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DOUBLE PULITZER PRIZE WINNER

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THE WRIGHT BROTHERS

The Dramatic Story behind the Legend

CHAPTER SIX

Out at Huffman Prairie

I found them in a pasture lot. . . . The few people who occasionally got a glimpse of the experiments evidently considered it only another Darius Green, but I recognized at once they were really scientific explorers who were serving the world in much the same way that Columbus had when he discovered America. AMOS I. ROOT I. It had been agreed earlier at home that were Wilbur and Orville to succeed at Kitty Hawk, Lorin, acting as press agent, would immediately notify the local papers and the Associated Press. So once Katharine had delivered their "SUCCESS" telegram to him, Lorin took it downtown to the city editor at the Dayton Daily Journal, Frank Tunison, who also represented the Associated Press. Tunison read the telegram and showed no interest. "Fifty-seven seconds, hey?" he said. "If it had been fifty-seven minutes, then it might have been a news item." No mention was made of the story in the Journal the following day, though it did get brief attention in the Dayton Daily News on an inside page. Elsewhere in the country, a ludicrously inaccurate account of what the brothers had done got much play as a result of a story that appeared on the front page of the Norfolk Virginian-Pilot under a banner headline: "FLYING MACHINE SOARS 3 MILES IN TEETH OF HIGH WIND OVER HILLS AND WAVES AT KITTY HAWK

ON CAROLINA COAST.” On the afternoon they had sent their telegram from the Kitty Hawk weather station, the brothers had specifically told the operator on duty, Joseph Dosher, that its content was confidential. When the operator at the Norfolk station asked if he could share the news with a friend at the Virginian-Pilot, the brothers had Dosher cable back, “POSITIVELY NO.” It had made no difference. From the scant solid information contained in the telegram, the Virginian-Pilot editors concocted an account that was almost entirely contrived. The Wrights’ machine, according to the story, had been launched from a platform and soared to an altitude of 60 feet. It was described as having two six-blade propellers, “one arranged just below the frame so as to exert an upward force when in motion and the other extends horizontally from the rear to the center of the car to furnish upward impetus.” Wilbur’s first historic utterance on flying the three miles was reported to have been, “Eureka!” Variations of the account appeared in the Washington Post, the Chicago Tribune, the New York Times, and the Cincinnati Enquirer, among others, but little happened as a consequence. In Boston, however, two businessmen, brothers Godfrey and Samuel Cabot of the prominent Cabot family, immediately sensed the story’s importance. Godfrey wrote at once to congratulate the Wrights and to ask for more details, which he received in a matter of days. More than satisfied with what he read, he sent off a letter dated December 31 to Senator Henry Cabot Lodge of Massachusetts, a distant cousin and known to be a close friend

of President Theodore Roosevelt. It seems to me [Cabot wrote] that this may fairly be said to mark the beginning of flight through the air by men unaided by balloons. It has occurred to me that it would be eminently desirable for the United States Government to interest itself in this invention. Senator Lodge passed the Cabot letter on to the War Department where nothing came of it. As for the reaction in Dayton, probably not one person in a hundred believed the brothers had actually flown in their machine, or if they had, it could only have been a fluke. Work at the bicycle shop on West Third Street resumed with, as Charlie Taylor said, no "jig steps" over what had been achieved. Of course, they were pleased with the flight. But their first word with me, as I remember, was about the motor being damaged when the wind picked up the machine and turned it topsy-turvy. . . . They wanted a new one built right away. . . . They were always thinking of the next thing to do; they didn't waste much time worrying about the past. The intention now was to build a heavier version of the Flyer with a more powerful and efficient engine. Nor could they neglect earning an income sufficient to cover expenses both at the shop and at home, not to say the cost of their experiments. As Charlie Taylor would repeatedly remind people, "There wasn't any other money." As it was during the first several months of 1904, bike repairs were numbering a steady fifteen to twenty a week. Then there were the sales of a great variety of bicycle "sundries," as they were referred to in the shop's large ledger books, including bike tires ($3.25 each), bike bells (10 cents), lamps ($1.00), pedal guards

(5 cents), spokes (10 cents), bike pumps (35 cents). Also, as usual in winter, sharpening ice skates (at 15 cents each) provided a steady additional sum. Sales of the brothers' own line of bicycles, the larger part of their income, would not pick up until April. So to have a sufficient number on hand took up most of their time at the workbenches behind the shop. The only wages to be covered were Charlie Taylor's $18 a week and Carrie Kayler's $2.50. To help cut expenses for continuing work on their flying machine, it was decided that further expeditions to Kitty Hawk, with all the attendant costs of travel and shipment of tools and material, could be dispensed with by finding a suitable stretch of open land close to home to serve as a practice field. Wilbur and Orville also wanted Charlie Taylor at hand, and there was concern, too, that the wind-driven sands of Kitty Hawk could play havoc with their engine. The likeliest "flying field," they concluded after some investigation, was a peaceful cow pasture of approximately eighty-four acres eight miles northeast of town called Huffman Prairie. For years a popular science teacher at the high school, William Werthner, had been bringing his students, including Orville and Katharine, on field trips there—outings Orville loved, which probably had something to do with the choice. The setting was spacious and relatively private, yet nothing like Kitty Hawk, with its broad horizons, wind in abundance, and nearly total privacy. Here, the space to maneuver had clearly defined parameters. Barbed wire and trees lined the borders, and there were besides a number of trees within the pasture, including one fifty-foot

honey locust covered with thorns. The field itself, as Wilbur said, was so full of groundhog hummocks it might have been a prairie dog town. In addition the electric interurban trolley line from Dayton to Columbus skirted one side of the property and so could provide passengers on board ample view of whatever might be going on. The work to be done here, the brothers knew, could well be the final, critical stage in the maturation of their whole idea. Here they would have to learn to do far more than what they had at Kitty Hawk. They must master the art of launching themselves safely into the air, of banking and turning a motorpropelled machine, and landing safely. Therefore, Wilbur stressed, they would have to learn to accommodate themselves to circumstances. If space was limited, then all the more need to learn to make controlled turns. If the interurban trolley meant daily public exposure, it would also provide ready, inexpensive transportation—a ride of forty minutes for a 5-cent fare—to and from town, and with a handy stop known as Simms Station at the edge of the field. They also knew the trolley's schedule, so if need be they had merely to time their flights to those hours when no one would be passing by. The pasture belonged to Torrence Huffman, president of Dayton's Fourth National Bank, whom the Wrights knew. When they inquired if they might rent it for their use, he said there would be no charge, so long as they moved the cows and horses outside the fence before flying their machine. While he liked the brothers well enough, Huffman was among the many who had little faith in their project. "They're fools," he told the

farmer who worked the adjoining land. Meanwhile, in what time they had to themselves, the brothers were sawing and planing lumber for the ribs of the new machine and working with Charlie Taylor on the new motor. Their nephew Milton, who as a boy was often hanging about the brothers, would one day write, “History was being made in their bicycle shop and in their home, but the making was so obscured by the commonplace that I did not recognize it until many years later.” With the advance of the spring of 1904, Wilbur and Orville could be seen out in the grass at Huffman Prairie swinging scythes or working with shovels leveling off ground hog mounds. When it came to building a shed in which to assemble and store their new machine, they put it in a corner as far removed from the trolley stop as the field permitted. Prior to their first test flight, lest anyone think them overly secretive, the brothers invited friends and neighbors to come and watch. The press would be welcome, too, but on the condition that no photographs be taken. Their concern centered on the chance of photographs being used to study those devices and control mechanisms of their own invention, which set their machine apart from others. On May 23, a Monday, despite an early morning rain, some fifty spectators gathered at Huffman Prairie. Bishop Wright, Katharine, Lorin and family were all present, as were a dozen or more reporters. But there was too little wind, and the test flight had to be postponed. Motor or not, wind was still essential. On Wednesday, when the crowd gathered again, rain caused another cancellation. The morning

after, May 26, there was more rain. But then, during a brief lull in the afternoon, and with hardly any wind and signs of another storm about to break, the brothers decided to “make a start.” With Orville at the controls, Flyer II rose a mere 8 feet and came down at once, within seconds after leaving the starting track. Something had gone wrong with the motor. It was hardly a premiere to stir excitement or silence the doubters. A few reporters, in an attempt to say something of interest, either praised the sturdiness of the machine or took liberties with the facts, such as to say the plane had gone 75 feet in the air. Bishop Wright, who had been watching with perhaps greater anticipation than anyone present, could only record in his diary, and accurately, that Orville had flown all of 25 feet. It would be speculated later by some that the failure that day had been a hoax staged as a way to deflate further interest by the public and the press. But this seems absurd given the nature of the brothers and the fact that almost nothing went right for them for the next three months. On June 10 the machine hit ground because of faulty steering. Another day, a tail was smashed during a landing. “Tail stick broken in starting,” Wilbur recorded of his flight on August 2. On another, the tail wires became “disarranged.” On August 5, Orville “struck ground at start.” Wilbur went again on August 8 and a wing hit the ground before leaving the track. Two days later, a rudder was smashed, a propeller broken. It seemed, as Wilbur would say, they had become “a little rusty” at the art of flying. “There was nothing spectacular about these many trials,” remembered Werthner,

the high school science teacher who was lending the brothers a hand with “their great white bird,” as he called it, “but the good humor of Wilbur, after a spill out of the machine, or a break somewhere, or a stubborn motor, was always reassuring. Their patient perseverance, their calm faith in ultimate success, their mutual consideration of each other, might have been considered phenomenal in any but men who were well born and well reared. These flights, or spurts at flying, they always made in turn; and after every trial the two inventors, quite apart, held long and confidential consultation, with always some new gain; they were getting nearer and nearer the moment when sustained flight would be made, for a machine that could maintain itself aloft two minutes might just as well stay there an hour, if everything were as intended. At last, on August 13, to their utter amazement, Wilbur flew over a thousand feet, farther than any of the flights at Kitty Hawk and five times what they had been able to do thus far at Huffman Prairie. “Have you heard what they’re up to out there?” people in town would say. “Oh, yes,” would be the usual answer, and the conversation would move on. Few took any interest in the matter or in the two brothers who were to become Dayton’s greatest heroes ever. Even those riding the interurban line seem to have paid little or no attention to what could occasionally be seen in passing, or to the brothers themselves as they traveled back and forth from town on the same trolley looking little different from other commuters. An exception was Luther Beard, managing editor of the Dayton Journal, who,

because of a class he taught occasionally at a school near Huffman Prairie, rode the interurban as far as Simms Station. “I used to chat with them in a friendly way and was always polite to them,” Beard would recall, “because I sort of felt sorry for them. They seemed like well-meaning, decent enough young men. Yet there they were, neglecting their business to waste their time day after day on that ridiculous flying machine.” They were also putting their lives at risk, as well they knew. On a flight on August 24, hit by a sudden gust of wind, Orville smashed into the ground at 30 miles an hour and though he suffered no broken bones was so badly shaken and bruised he was unable to fly for another month. Where Samuel Langley had required the least wind possible for his aerodrome experiments, the Wrights needed more wind. Clearly at Huffman Prairie they would have to make up for what had been so plentiful at Kitty Hawk, to devise, in Wilbur’s words, some way to “render us independent of wind.” The solution would have to be both simple and inexpensive, and so once again straightforward improvisation solved the problem. They designed and built their own “starting apparatus,” a catapult powered by nothing more than gravity. Its components consisted of a 20-foot tent-shaped tower, or derrick. Made with four wooden poles, it looked like a drilling rig. At the apex, over a pulley, hung by a single rope metal weights totaling as much as 1,600 pounds. The rest of the rope ran from the base of the tower down the launching track on pulleys to the end of the track to another pulley. Then the rope ran back again to the

starting point, where it hitched on to the front of the Flyer, which sat on the launching track on a large rimmed bicycle hub. With a team of horses the brothers would haul the weights up to the top of the derrick. Then, when all was ready, the pilot would release the rope, the weights would drop, the machine would be pulled rapidly down to the end of the track, then shoot into the air at a speed greater by far than possible when attempting takeoff by motor only. On September 7, with scarcely any wind, Wilbur tested the new catapult for the first time, starting with only 200 pounds of weights. By day's end, having added another 400 pounds, he could take off with no difficulties and flew longer distances than ever. Little more than a week later, on September 15, he not only flew fully half a mile but for the first time succeeded in turning a half circle, a major achievement. Not one reporter bothered to attend during this time. Nor did public interest increase. With few exceptions there seemed no public interest at all, no local excitement or curiosity or sense of wonder over the miraculous thing happening right in Dayton's own backyard. Nor did anyone seem to appreciate the kind of minds, not to say the extraordinary skill and courage, needed to succeed at so daring a venture. In five months the brothers were to make no less than fifty test flights at Huffman Prairie, and Charlie Taylor, ever on hand in case of motor trouble, would say that every time he watched either of them head down the starting track, he had the awful feeling he might never again see him alive. To Wilbur and Orville, it seemed fear was a stranger. Writing his

autobiography later, James Cox, publisher of the Dayton Daily News, remembered reports coming “to our office that the airship had been in the air over the Huffman Prairie . . . but our news staff would not believe the stories. Nor did they ever take the pains to go out to see.” Nor did Cox. When the city editor of the Daily News, Dan Kumler, was asked later why for so long nothing was reported of the momentous accomplishments taking place so nearby, he said after a moment’s reflection, “I guess the truth is that we were just plain dumb.” II. That same September, 200 miles to the northeast in Ohio, a small, elderly gentleman set off in his automobile, as he had before earlier in the summer, for Huffman Prairie on invitation from the Wrights to come see the progress they were making. He was Amos Ives Root of Medina, a town just south of Cleveland. Always neatly dressed, his short white beard trimmed, he stood no more than five feet three. But his energy and curiosity were great indeed. His bright hazel eyes seemed to miss nothing. Born in a log cabin, he had started his own business, manufacturing and marketing beekeeping supplies, in 1869, at age thirty, and soon became widely known as “the bee man” of Ohio. At sixty-four, he was extremely well-off, happily married, a father of five, proud grandfather, and quite free to pursue a whole range of active interests. As would be said in the Medina County newspaper, Amos Root bubbled with enthusiasm and a constant desire to “see the wheels go round.” He loved clocks, windmills, bicycles, machines of all kinds, and especially his Oldsmobile Runabout. Seldom was he happier than when out

on the road in it and in all seasons. While I like horses in a certain way [he wrote], I do not enjoy caring for them. I do not like the smell of the stables. I do not like to be obliged to clean a horse every morning, and I do not like to hitch one up in winter. . . . It takes time to hitch up a horse; but the auto is ready to start off in an instant. It is never tired; it gets there quicker than any horse can possibly do. As for the Oldsmobile, he liked to say, at $350 it cost less than a horse and carriage. He was also deeply religious, a Sunday School teacher, an active supporter of the temperance movement, and enjoyed conveying his thoughts and ideas on these and a host of other topics in the column he wrote for the Root company's beekeepers trade journal, Gleanings in Bee Culture. It was to be he of all people, the Ohio bee man, who would recognize as no one yet had the genius of the Wrights and the full importance of their flying machine. He would describe in detail what he saw happen at Huffman Prairie, and further, he would describe it accurately. It was not the Dayton papers that finally broke the story—or the Chicago Tribune or the New York Times or Scientific American—but Amos Root's own Gleanings in Bee Culture. He had begun correspondence with the Wrights in February. "I hope you will excuse me, friends, for the liberty I take in addressing you. Let me say briefly that I have all my life had an idea in my head that a flying machine should be made on the principle of flying a kite." He wanted very much, he continued, to be on hand for their experiments and promised never to "undertake to borrow any of your ideas." In response

the brothers had said they would let him know when their new machine was ready for trial. Through spring and into summer, waiting for word to come, Root kept writing. “Please excuse me, friends, but I am so anxious to see that airship I can hardly sleep nights.” When in mid-August word finally came, he was off at once for Dayton in his Runabout, a journey of no little uncertainty then given the state of the roads. He had arrived at the time when the Wrights’ machine was not performing well—certainly not as they wished—but for Root the spectacle of actual flight was “one of the bright spots in my life,” as he told them in gratitude. He had promised he would say nothing of what he had seen at Huffman Prairie in anything he wrote in his Gleanings in Bee Culture, and good as his word, he described only his venture by automobile. “In a recent trip of 400 miles through Ohio,” he wrote, “I passed through Ashland, Mansfield, Marion, Delaware, Marysville, Springfield, Dayton . . . so many different towns in a brief period of time that I can hardly remember now which was which.” He told how he tried and succeeded in not killing any of the numerous chickens on the road, or scaring any of the horses. He wrote of having to give the engine fresh water every ten or fifteen miles, and how wherever he stopped, for water or gasoline, a crowd gathered. He described the torn-up streets and mud roads en route, but then could not resist adding: And, by the way, we are already, at least to some extent, ignoring not only mud roads, but roads of every kind, and climbing through the air, and I do not mean by means of the gas-balloon either. But I am not at liberty just

now to tell all I know in regard to this matter. In the second week of September came word from the Wrights that he should return without delay. He reached Dayton on Tuesday, September 20, 1904, the day Wilbur would attempt something never done before in the history of the world. He would fly a power machine in a complete circle. Still recovering from his crash in August, Orville would be on the sidelines watching with Root and Charlie Taylor. Apparently no one else was on hand at Huffman Prairie. “God in his great mercy has permitted me to be, at least somewhat instrumental in ushering in and introducing to the great wide world an invention that may outrank electric cars, the automobiles . . . and . . . may fairly take a place beside the telephone and wireless telegraphy,” Root would begin his eyewitness account. But before describing what he saw happen, he made a point of stressing that the Wrights were not just the sort who love machinery, but were “interested in the modern developments of science and art.” He had been “astonished” by the extent of their library and to find in conversation that “they were thoroughly versed not only in regard to our present knowledge, but everything that had been done in the past.” In saying this in what he wrote, he would be the first to recognize how much more there was to Wilbur and Orville than most imagined, even among the relative few who took time to give it some thought. They were not simply “another Darius Green,” Root stressed, but “scientific explorers” serving the world much as Columbus had. He described in his account of September 20 how Wilbur took

his place lying flat to offer less wind resistance, how the engine was warmed up to speed, and, how, with everything ready, “a sort of trap” (the catapult) was sprung, and suddenly the machine was aloft. The plane flew low, never rising more than 20 to 25 feet above the ground. “I was surprised at the speed and I was astonished at the wonderful lifting power.” Then it had turned and headed straight back toward him, and with feelings very like those expressed by John T. Daniels after seeing the first flight at Kitty Hawk, he wrote: When it first turned that circle, and came near the starting point, I was right in front of it, and I said then, and I believe still, it was one of the grandest sights, if not the grandest sight, of my life. The plane was still flying low, and Orville, who was standing close by Root, urged him to get to one side, for fear it might suddenly come down. To Root the landing of the plane was hardly less amazing: When the engine is shut off, the apparatus glides to the ground very quietly and alights on something much like a pair of light sled-runners [skids], sliding over the grassy surface perhaps a rod or more. Whenever it is necessary to slow up the speed before alighting, you turn the nose uphill. It will then climb right up on the air until the momentum is exhausted, when, by skillful management, it can be dropped as lightly as a feather. The “skillful management” was breathtaking. It was not just that the machine was like no other on the face of the earth, he wrote, but there was probably no one “beyond these two who learned the trick of controlling it.” When Columbus discovered America, he did not know what the outcome would

be, Root would conclude his account. Not even “the wildest enthusiast” could have foreseen. “In a like manner these two brothers have probably not even a faint glimpse of what their discovery is going to bring to the children of men.” As for Huffman Prairie, it was henceforth historic ground. Here man and his machine had “‘learned to fly,’ very much like a young bird out of its nest learns by practice to use its wings.” Root pictured a wondrous time near at hand, “when we shall not need to fuss with good roads nor railway tracks, bridges, etc., at such enormous expense. With these machines we bid adieu to all these things. God’s free air, that extends all over the earth, and perhaps miles above us, is our training field. . . . When you see one of these graceful crafts sailing over your head, and possibly over your home, as I expect you will in the near future, see if you don’t agree with me that the flying machine is one of God’s most gracious and precious gifts. In December, Amos Root returned to Dayton—and by the interurban this time — and met with the Wrights at 7 Hawthorn to read aloud what he had written in advance of publication. It was one last step to ensure accuracy and apparently it all went well. What suggested changes, if any, or comments the Wrights may have offered are not known. Why they had put such trust in Root was never explained. But clearly they had much in common. He, too, in the early days of his beekeeping enterprise had been taken for a “nut.” He had succeeded with his ideas only by close study. Importantly, beginning with his first visit in August, he had shown himself true to his word and ready to cooperate in

any way he could to achieve accuracy in what he wrote. Like their father, he was a man of strong religious convictions, and it was of no small importance that Bishop Wright approved. As he wrote in his diary, “Mr. Root seems to be a fine gentleman.” Perhaps above all, Wilbur and Orville knew from their first meeting with Root that his regard for them was altogether genuine, his belief in the possibility of human flight no less than their own. At the time his article appeared in Gleanings in Bee Culture in January 1905, Root sent a copy to the editor of Scientific American, saying it could be reprinted at no charge. The editor paid it no mind. Instead, in an article published a full year later, “The Wright Aeroplane and Its Fabled Performances,” the magazine chose to cast still more doubt: If such sensational and tremendously important experiments are being conducted in a not very remote part of the country, on a subject in which almost everybody feels the most profound interest, is it possible to believe that the enterprising American reporter, who, it is well known, comes down the chimney when the door is locked in his face . . . would not have ascertained all about them and published . . . long ago? The thought that Amos Root was the “enterprising reporter” apparently never entered the editor’s mind. For their part the brothers refused to get worked up or to speak out. “If they will not take our word and the word of many witnesses,” wrote Wilbur, “. . . we do not think they will be convinced until they see a flight with their own eyes.” III. In October, a month after Amos Root’s visit, came the first clear sign that if the American press and the U.S.

government had no interest, there were those on the other side of the Atlantic who did. An officer of the British Army's Balloon Section, Lieutenant Colonel John Edward Capper, appeared in Dayton and did not hesitate to inform the brothers that he had come at the request of his government. Reluctant to have him come with them to Huffman Prairie just yet, they instead showed him photographs of recent flights. But it was they themselves who impressed the visitor more than anything, and he invited them to submit a proposal for the sale of their Flyer II to the British government. They were unwilling to comply, partly because they were "not ready to begin considering what we will do with our baby now that we have it," as Wilbur had confided to Octave Chanute. Furthermore, as patriotic Americans, they would be ashamed to offer it to a foreign government without their own country having a first chance. On November 9, in celebration of President Theodore Roosevelt's resounding election, Wilbur flew almost four circles around the field at Huffman Prairie. Then, on the third day of the new year 1905, he called on the newly elected local congressman, Republican Robert Nevin, to explain the situation. Nevin suggested that Wilbur write a proposal for Secretary of War William Howard Taft. The letter, dated January 18 and signed by both Wilbur and Orville, stated that their efforts of the past five years had produced a flying machine that "not only flies through the air at high speed, but it also lands without being wrecked." During 1904 they had made 105 flights. They had flown in straight lines, circles, over S-

shaped courses, in calms and great winds, and brought flying to the point where it could be of great practical use in various ways, “one of which is that of scouting and carrying messages in time of war.” Congressman Nevin forwarded the letter to the War Department. From there it was passed on to the Board of Ordnance and Fortification, the same agency that had seen the $50,000 it provided to Samuel Langley come to nothing. Congressman Nevin then received a standard formal rejection from the board, dated January 26, explaining that so great were the number of requests for allotments for experiments in mechanical flight that the device in question must first stage a “practical operation” at no expense to the United States; and from Wilbur and Orville’s letter it appeared to the board that their machine had not yet reached that stage. It was a standard reply sent irrespective of the fact that the Wrights had made no appeal for financial support. Possibly this was an instance of extreme wariness within the board because of the Langley experience of becoming involved again with experimental aviation. Or it could have been a case of plain bureaucratic ineptitude. Or that the claims made by the Wrights for their Flyer, like those in so many crank proposals, seemed too preposterous to be taken seriously. To Wilbur and Orville it was a “flat turn down,” which they seem to have been expecting. “We have taken pains to see that ‘Opportunity’ gave a good clear knock on the War Department door,” Wilbur told Octave Chanute. It has for years been our business practice to sell to those who wished to buy, instead of trying to force goods upon

people who did not want them. If the American Government has decided to spend no more money on flying machines till their practical use has been demonstrated in actual service abroad, we are sorry, but we cannot reasonably object. They are the judges. The brothers had already written to Colonel Capper in England to say they were ready to make their proposal. The British War Office responded at once, and serious correspondence began. As always, they had no time to waste. Work went on. A new 1905 Flyer III was under way, a machine "of practical utility," as the Wrights would say. In fact, the Flyer III would prove to be the first practical airplane in history. Talk of ideas continued without cease among themselves and with Charlie Taylor while at work in the shop, or standing beside the Flyer between tests at Huffman Prairie, or at work inside the shed, or while riding the trolley. The fascination with birds continued no less than ever. If Ohio offered nothing comparable to the multitudes of gannets and gulls and buzzards in the skies of the Outer Banks, Ohio provided crows aplenty. In language few others could possibly have understood or appreciated, Wilbur wrote to Octave Chanute: The power consumed by any bird or flying machine may be figured from the formula wv/ac, in which w = weight, v = velocity 1/a = ratio of drift to lift, and 1/c = efficiency of the screws or wings of propellers. In the case of the crow flying at 34 ft. per second, or 2,100 ft. per minute, I would fix the value of 1/a at 1/8, and 1/c at 1/.75; when we have (1 × 2100)/(8 × .75) = 350 ft. lbs. per pound of weight. The minimum value of 1/a may be rendered

independent of velocity by regulating the size of the wings. The value of 1/c is about the practical limit of the efficiency of screws under usual conditions, and I see no reason for believing that wings are more efficient than screws, as propellers. . . . Birds unquestionably develop power many times greater than is consumed by our Flyer, per pound weight. If you will fix in your mind the distance within which a small bird acquires full speed, say 30 miles an hour, and then figure the power necessary to accelerate its weight to this velocity, I think you will be astonished. And there was more, always more to learn and think about. The new Flyer III was more sturdily built than its predecessors, its motor more powerful, producing as much as 25 horsepower. The double rudder had been enlarged, the wing area slightly reduced, and the leading edges of the wings made more effective. But the "improvements" this time, as the brothers would stress, resulted mainly from "more scientific design" and changes in methods of balancing and steering. The most important change was to move the forward rudder even farther forward—for better longitudinal, or nose to tail, control. They had discovered that most of their troubles could be remedied by tilting the machine forward a little so its flying speed could be restored. "The best dividends on the labor invested," they said, "have invariably come from seeking more knowledge rather than more power." Once the test flights got under way in June, it became clear the improvements were working. Moreover, the two pilots were "rusty" no longer. In one important close call on September 28, as Orville would

recount, he was circling the great honey locust tree when the machine suddenly began to turn up one wing and stall. “The operator, not relishing the idea of landing in a thorn tree, attempted to reach the ground.” The left wing struck the tree at a height of 10 or 12 feet and carried away several branches, but by putting the plane into a brief dive Orville was able to nose the plane upward again, and the flight, which had already covered 6 miles, continued on to the starting point. The lesson learned was another step forward—the brief dive had restored the speed needed to increase the lift and thereby straighten the effect of the warp. Wilbur by then had flown 11 miles on a single run, Orville, 12 miles, then 15. To both of them, this, their Flyer III, with its “improvements,” was as big an advance as Flyer I had proven to be at Kitty Hawk. It was at Huffman Prairie that summer and fall of 1905 that the brothers, by experiment and change, truly learned to fly. Then, also, at last, with a plane they could rely on, they could permit themselves enjoyment in what they had achieved. They could take pleasure in the very experience of traveling through the air in a motor-powered machine as no one had. And each would try as best he could to put the experience in words. “When you know, after the first few minutes, that the whole mechanism is working perfectly,” Wilbur was to say, “the sensation is so keenly delightful as to be almost beyond description. Nobody who has not experienced it for himself can realize it. It is a realization of a dream so many persons have had of floating in the air. More than anything else the sensation is one of perfect peace, mingled with the

excitement that strains every nerve to the utmost, if you can conceive of such a combination." Once into the air Orville would write, the ground was "a perfect blur," but as the plane rose higher the objects below became clearer. At a height of one hundred feet you feel hardly any motion at all, except for the wind which strikes your face. If you did not take the precaution to fasten your hat before starting, you have probably lost it by this time. The operator moves a lever: the right wing rises, and the machine swings about to the left. You make a very short turn yet you do not feel the sensation of being thrown from your seat, so often experienced in automobile and railway travel. You find yourself facing toward the point from which you started. The objects on the ground now seem to be moving at much higher speed, though you perceive no change in the pressure of the wind on your face. You know then that you are traveling with the wind. When you near the starting-point, the operator stops the motor while still high in the air. The machine coasts down at an oblique angle to the ground, and after sliding fifty or a hundred feet comes to rest. Although the machine often lands when traveling at a speed of a mile a minute, you feel no shock whatever, and cannot, in fact, tell the exact moment at which it first touched the ground. The motor close beside you kept up an almost deafening roar during the whole flight, yet in your excitement, you did not notice it till it stopped! By now the brothers were openly encouraging family and friends to ride out and see the show. Bishop Wright and Katharine, Lorin and his wife and

children, and some seventeen friends and neighbors came by trolley or automobile, and many more than once. Next-door neighbors John Feight and his son George were among them. Torrence Huffman, a doubter no longer, brought along three of his children. Charles Webbert came to watch, as did Frank Hale, the grocer, and druggist W. C. Fouts, whose respective establishments were close by the bicycle shop on West Third Street; and Frank Hamberger, the hardware dealer whose inventory Wilbur and Orville had helped save at the time of the 1898 flood. On the afternoon of October 5, 1905, before more than a dozen witnesses, Wilbur circled the pasture 29 times, landing only when his gas ran out. “I saw Wilbur fly twenty-four miles in thirty-eight minutes and four seconds [in] one flight,” wrote the Bishop. In fact, this one flight was by far the longest yet, longer than all the 160 flights of the three previous years combined. By the time the experiments ended, the brothers had made 105 “starts” at Huffman Prairie and thought it time now to put their creation, Flyer III, on the market. By this point, too, the Dayton press had at last awakened. The Wrights, reported the Daily News, were making sensational flights every day as local witnesses were happy to attest. W. C. Fouts, the druggist, was quoted saying: When I went out to Huffman Prairie I expected to see somebody’s neck broken. What I did see was a machine weighing 900 pounds soar away like an eagle. . . . I told a friend about it that night and he acted as if he thought I had gone daft or joined the liar’s club. An American correspondent for a German aeronautical journal had come to

Huffman Prairie and begun a series of articles on the brothers. The French were beginning to make inquiries. Prodded by Octave Chanute to try one more time to rouse interest in Washington, on the chance that the new president of the Board of Ordnance and Fortification, Major General J. C. Bates, might be of different mind, the brothers wrote again. Their earlier proposal appeared to have been given "scant consideration," they said in their letter of October 9. "We do not wish to take this invention abroad, unless we find it necessary to do so, and therefore write again, renewing the offer." By this time the brothers were routinely making controlled flights in their aircraft of 25 miles or more. But the response from Washington, as Katharine wrote to the Bishop, was "the same thing that they had before." The only difference was they were told that before any consideration of their machine, they must provide "such drawings and descriptions . . . as are necessary to enable construction," something the Wrights refused to do. They tried again, asking what requirements in performance were expected by the board, and were told the board did not care to formulate any requirements until a machine was produced and able to provide "horizontal flight and to carry an operator." A sampling of photographs of Flyer III in action could have been requested or a visit to Huffman Prairie by someone from Washington might well have resolved the issue. Told what the response of the board had been, Octave Chanute concluded, "Those fellows are a bunch of asses." Progress with the English having stalled, Wilbur informed an interested group

in Paris that he and Orville were ready to discuss sale of the Flyer III to the French government. In the last week of 1905, Bishop Wright recorded in his diary: Thursday, December 28 The morning was beautiful, and a fire hardly needed. A Frenchman by the name of Arnold Fordyce came to investigate and drive a trade for a flying machine. They agreed on terms. Fordyce represented a syndicate of wealthy French businessmen, but the Wrights assumed the deciding authority would be the French military, which was the case. The syndicate would purchase a Wright Flyer as a gift to the French government. According to the agreement the brothers were to receive one million francs, or $200,000, for one machine, on the condition that they provided demonstration flights, during which the machine fulfilled certain requirements in altitude, distance, and speed. Details of the final terms were to be negotiated by a French commission assigned to come to Dayton. Meantime, a sum of 25,000 francs, or $5,000, was to be deposited in a New York bank in escrow. $200,000 was an exceedingly large sum and the $5,000 the brothers were to receive, however the further negotiations went, would more than cover all the expenses they had had since first going to Kitty Hawk. Saturday, December 30 In the afternoon [wrote the Bishop in his diary], Wilbur and Orville sign up the contract with Mr. Arnold Fordyce, of Paris. . . .