The Dream That Wouldn't Down – 1965

Narrator: History is the most human of endeavors since humans alone possess a conscious memory and can learn from it. If the lives of great men so often seem cold and inhuman, maybe it's because their lives are told in paper dates and stone monuments.

Robert Goddard was the discoverer of the world of the rocket. He understood its workings and its potential before most people understood the Tin Lizzie. The world did not discover him until after his death in 1945. Today, he's widely recognized as a great man of science, and the greatness can be found in his work. Robert Goddard, who dared to take a first step into space, man's great adventure.

The man can be discovered through the words of the person who knew him best, Mrs. Robert Goddard.

Esther Goddard: I'm only an echo of Bob really, only a stand-in for him. But it had to be, because my husband died at 62. He should have had more years to work, to organize his materials and summarize things. In the years that I have worked on his papers, I have constantly had the feeling that Bob would have done all this much better than I. But lacking Bob, I think I'm the next best thing because I care more.

My husband was a product of New England and Boston. He was born in Worcester in August– in October of 1882, of Yankee stock. He lived in Boston for the first 16 years of his life and then returned to Worcester.

Narrator: He was just an average schoolboy and showed no special aptitude in mathematics. However he read a good deal of early science fiction such as Jules Verne and H.G. Wells.

Esther Goddard: But the idea of making something that would fly into space came one day when he was 17 years old in Worcester. He had climbed a cherry tree to trim off some branches. And as he looked across the meadow, he had a daydream about how wonderful it would be to make something that would go higher than anything had ever gone before.

Narrator: During his college years the dream wouldn't be put away. It wouldn't down. It was strengthened by what young Goddard taught himself and what he learned in school. He studied physics at Worcester Polytechnic Institute, later at Clark University in the same Massachusetts town. Here, near the physics building at Clark University, Goddard tried out his first rockets over and over again. Every now and then the sign of lift-off, like the flaring of a match, but nothing more. Then he attended Princeton University, arriving just as its president, Woodrow Wilson, was abandoning Old Nassau for greater responsibilities. At Princeton he studied further, developed a theory of rocket propulsion. And he had taken out a few patents, just in case. Then Goddard fell victim to tuberculosis. After recovering he became a teacher of physics at Clark. He continued, however, to teach himself new things, a process known as research. But he battled on. For a dream this persistent, you cannot ignore it. And a man's dream, however private, can be shared.

Esther Goddard: Yes, it was the fifth time that he came back to Clark and I met him. I had become secretary to the president of the university. He asked me to type his reports about the

work during the war, and I was glad to do so. One report was published in January of 1920. A footnote in it mentioned, in very small type, the possibility of a rocket, such as described in the text, was capable of reaching the Moon with a batch of flash powder, enough to be visible through telescopes from the Earth.

He submitted a carefully written paper to the Smithsonian Institution, which granted him in early 1917 the sum of $5,000. It was given for the strictly scientific purpose of exploring the upper atmosphere. However as my husband worked, it came to him that he had a really potent weapon. He wrote the Smithsonian again and asked them to inquire if the military would be interested in such a device if he was working on it. This was a single-charge solid-propellant rocket. The U.S. Signal Corps was interested and financed the work throughout the year 1918. Just before the armistice he showed it at the Aberdeen Proving Ground. This performed beautifully and was shelved later on. It became, however, the bazooka of World War II. Of course the armistice meant that interest in the development of weapons almost vanished.

Narrator: In Germany, scientist Hermann Oberth and colleagues were electrified by Goddard's dream. They corresponded with Goddard for a while; then, silence. Here in America the sensation left the community of scientists unimpressed. With a Smithsonian grant, Goddard built a rocket launch tower at Auburn, Massachusetts and began to step up the pace of his experiments.

Esther Goddard: Here he made many tests, static and flight, of the liquid propellant rocket. Well of course there were many failures, but there were just enough successes to keep our spirits up.

Narrator: The first real success happened on March 16, 1926. Forty-one feet up it went, this first liquid-fueled rocket. And so began space exploration at Auburn. Only a beginning, but a beginning is something more than a dream alone. Goddard wrote of ion propulsion engines, which were in the dream stage. He wrote of solar sails on his rockets that would gather light from the stars for outbound travel. He wrote of freezing human protoplasm for spaceflights that would otherwise exhaust the lifespan of man. He dreamed, but he also worked. Three years after his first flight, his rocket went twice as high. It made such a noise that the state fire marshal banned any flight to the Moon from the southern soil of Massachusetts. So Goddard shifted his rocket base to a shell-pocked artillery range. Here at Fort Devens the work went on. He had a visitor one day so famous that the town was truly impressed. Charles Lindbergh, the Lone Eagle, symbolic of the Air Age, talked to his older counterpart who would in time become symbolic of the Space Age.

Money was needed, and Lindbergh had the name to pry open the pocketbooks. It took some doing: a whole year. It was Harry Guggenheim, naval aviator in the First World War, who came through. A long-time friend of Lindbergh's, Harry went to his father Daniel, the mining financier. Even though the Guggenheim fund for the promotion of aeronautics was already in existence, Daniel Guggenheim provided his own personal funds: $25,000 per year for four years. And thus Robert and Esther Goddard transferred the rocketry business out of Massachusetts, out to where the land is stark and empty.

Esther Goddard: We set up a machine shop on Mescalero Ranch, which we rented, and later we set up a static test tower close to the shop. This is where the rocket was anchored down and

the scene of the many early tests. Later we established a launching tower 10 miles northwest of Roswell, out on the prairie. It was 60 feet high, but later increased to 85 feet high. The rockets of that time were brought out on a trailer and were rather crude, but still much larger and much better than what he had been able to do at Clark in his spare time. For him it was seventh heaven to spend all day every day on rocket research. No attempt was made in these rockets to make it light because these were not intended for flight.

The three main problems we had to attack were propulsion, guidance, and recovery. The propulsion required many static tests at the very beginning. And it took about two months of static testing. By December of 1930 we had the establishment going very well, had made a basis of static tests to try better propulsion methods, and in December of 1930 we had a first very fine flight in New Mexico. The static tests require all kinds of gauges to make sure that we know what is happening in every part of the anchored-down rocket; a moving picture camera takes pictures of these gauges.

The tests usually began with a caravan in the early morning across the desert. The rocket was always carried on a trailer. In the early days the trailer was rather small; later we had a very large four-wheel one. We also started with a modest Model T truck, but later we had a very fancy panel truck. This was a happy day for the boys who had to keep that Model T running. The rocket even in 1930 was the same cigar shape as we have now at Cape Canaveral. Of course it was not fueled until after it had been placed in the launcher. These were light rockets, usually running about 12 feet high, although they varied from model to model.

Our control wires were rolled out on the prairie and stretched from the launching tower to the shelter. After all the controls were set, all the tanks had been thoroughly fueled and checked, all the staff took the Model T and went up to the thousand-foot shelter. Each man had his precise piece of observation to undertake. One of course had a stopwatch to check the length of time of flight; one threw the switches for the electrical controls; another had field glasses to note any revolution about its own axis of the rocket; and 3,000 feet away from the tower was a recording telescope manned by one of the observers. The cloud of black smoke allowed the moving camera operator to follow it a little more easily.

This is an early informal picture of a device that my husband developed to persuade a Patent Office examiner to grant him certain claims in a patent covering a gyro to guide a rocket. It was very difficult to understand the principles of gyroscopes, and no blame should be attached to the Patent Office examiner. He got his patent on the basis of this device. The gyro operates under a very special system of laws, but it is the heart of the rocket. It controls the two sets of vanes that my husband developed to guide a rocket in space. One set is moveable into the blast, down low; the other set is a little higher up and folded against the side of the rocket. The first are called the blast vanes, and the second set are called the vanes moveable into the streamline. In order to test the actual operation of these two sets of vanes from the gyro, we hung the rocket on our static testing tower near the shop and tilted it in various directions to make sure that all was going well.

The nose cone of our rocket contained a parachute, in fact two of them, one for the cap itself to come down on and one to help the main rocket to come down. It also contained a barograph from the National Aeronautics Association to make an official record of whatever altitude it might attain.

The pump turbines were very complicated indeed. My husband had hoped that various pump companies might undertake to develop these because, after all, he was not a pump engineer. But all was shapened by the needs that he expressed. It had to be extremely high speed, which was perhaps attainable by the company, but the matter of extremely light weight was the one that stopped them. They said that it would cost so much that they couldn't undertake the work. My husband sent a set of blueprints to one pump engineer who had impressed him well, and the engineer wrote back that the drawings were very good indeed and he thought there was a chance they would work. So my husband's employees from those drawings made the pumps and turbines that are now in the rocket in the National Air Museum. Engineers who have seen the rocket have marveled at the quality of work, the close tolerances that his staff were able to maintain.

We had a few flights with the pump-turbine rocket before the war clouds came down. Far out on the desert near Roswell, Hitler was reaching great distances.

In taking the moving pictures of these flights, it was necessary to gauge just from the point where propulsion visibly ceased how high the coasting would go and then where it would tilt downward and where the parachute would blossom. You see here a very beautiful descent by parachute. This was quite a problem to solve, this matter of reentry so that we could salvage a good portion of the rocket. It was difficult to have a parachute open at the maximum height because the conditions vary so at that time. We could salvage a good deal more than half the rocket usually if it came down by parachute.

Narrator: In 1930 Daniel Guggenheim died. Later Goddard's grant was suspended and work was stopped. But after two years back at Clark University, Goddard returned to New Mexico, for the grant was renewed by the Guggenheim Foundation itself. The very day after their return to Mescalero Ranch came a visitor, Charles Augustus Lindbergh, whose purpose was to spur on the deliberate Goddard in his work.

May 1935. Nell climbed 7500 feet, the highest to date. The town of Roswell was a fruitful town for the Goddards.

Esther Goddard: Oh yes indeed, the thirties were the golden years of the Goddards. We had a very pleasant place to live. The climate that was good for the rocket was also very good for my husband, although that was only incidental. And he could rest evenings at a nice cool country home, paint on Sundays when he liked; he could also play the piano, and we occasionally went to the nice air-cooled moving picture theater to see Laurel and Hardy and some of his – […] – some of his other favorites.

Narrator: March 1937. Nell had grown to 16 feet 5 inches long. Off she went. She rose higher and more nearly vertical than in any other previous flight, Goddard told his diary, between 8,000 and 9,000 feet. This was the high point of the space effort, entirely unofficial, of the United States of America.

In 1939, Goddard and Lindbergh met for the last time. The meaning of the visit: let's move fast. They didn't know how much ahead of us the Germans were in this new science of rocketry. As the war in Europe broke out, Robert Goddard tried to interest the United States Army Air Corps

in the potentiality of the 500-pound rocket that had been evolved. Harry Guggenheim, in the name of the Guggenheim Foundation, offered his private money to back up the defensive power of America.

Esther Goddard: My husband came to Washington and joined Mr. Guggenheim when the latter offered the entire shop in Roswell, the staff, my husband's services, and all the knowledge know-how that had been worked out down there. My husband described what he had, showed the film. The military were politely interested but they could see no future in the rocket as a separate weapon. They did envision it as a possible adjunct to the airplane then in existence. This would be a jet assisted take-off. One member of the meeting was a representative in the Army Air Corps, and I think he shocked almost everyone present by remarking that World War II would be won with mortars.

The second thing that was of course much more pleasing to us was that a procession of young fliers had begun to come to Mescalero Ranch. These were fighter pilots, also some of the commercial pilots, who had gained a keen sense of the limitations of the propeller and they knew something fresh had to come. They were interested in this rocket; they thought possibly this was the answer, at least for bursts of power that might get them out of trouble in a pinch.

Narrator: The Goddards and their whole Mescalero team went to Annapolis, sometimes running as many as 50 tests a day. In September 1942 his JATO, or jet assisted take-off motor, was put on a PBY flying boat and tested on the Severn River. The angle of climb was a lot better already than from propeller thrust alone. The rocket as a means of transportation was on its way. On the sixth time, the pilot disconnected the safety device and burned the tail. The X-2 airplane, rocket-driven, was the next stage in the evolution of Goddard's rocket. Soon would come the X-15, the sounding rockets, the orbiting rockets.

But Goddard was older now and ill. It was in 1944 that England and then the entire world discovered how well and how secretly the Germans had done their homework.

Robert Goddard was dead at the age of 62, a victim of cancer. A generation has passed since Robert Goddard died. Space is no longer so distant from that long-ago cherry tree where a boy dreamed a dream that would not down. The boy became a man and said: "It is difficult to say what is impossible. For the dream of yesterday is the hope of today and the reality of tomorrow."

Esther Goddard: My husband felt that he was a very fortunate man, and I think few who knew him, even in Worcester or at Roswell, could not sense that my husband was a highly gifted and a very, very happy man because he was doing precisely what he wanted to do most in all this world. As someone said a long time ago, the pursuit of truth is more precious than the attainment of it.