

How America Muffed Space Supremacy

*Had we heeded Robert H. Goddard's warnings, U. S. would hold
unchallenged lead in rockets and satellites today.*

by Raymond Schuessler

HOW IRONIC it is that the American breakthrough in man's ancient yearning to explore the reaches beyond his own planet should have originated nearly half a century ago in the mind of a brilliant, self-effacing Worcester, Massachusetts, physicist, stigmatized in his own time as a "moon-man."

But the crowning irony is that if his own countrymen had listened to Dr. Robert Hutchings Goddard, the United States today would be 18 to 20 years ahead of its present position in its race with Soviet Russia into space. There would, in fact, have been no race.

Goddard tried to interest our Armed Forces in the potential of rockets in 1940, but got a polite "brushoff" which cost us an unchallenged lead in rockets and satellites. Tragically, Goddard lived only long enough to see his dream of man's conquest of space come to fruition in the form of a terrible new weapon—the German V-2 rocket—in the hands of an enemy.

In May, 1945, only three months before Goddard's death, captured German rocket experts were asked by U.S. Army specialists about the V-2's that rained death on London in the last months of World War II. To the Americans' surprise, a member of the German delegation replied:

"You have the man in your country who knows all about rockets, and from whom we got our ideas—Robert H. Goddard."

Robert Goddard's story reads like a novel by Jules Verne, but minus the glory which crowned the struggles of Verne's heroes. The "father of space travel" won his battle to prove that man could send a rocket hurtling into space. But the world-wide fame he so richly earned never came in his own lifetime. Quietly and diligently, Goddard worked for decades to perfect his ideas and to convince skeptics, including leaders in the U. S. Government and Armed Forces, of their tremendous implications. Among other advances, Goddard was the first man to:

Develop (in 1918) a projectile rocket, prototype of the World War II "bazooka" and forerunner of present solid-fuel rockets.

Develop and shoot a liquid-fuel rocket (March 16, 1926, at Auburn, Massachusetts.)

Shoot a rocket faster than sound (1935, near Roswell, New Mexico.)

Develop a gyroscopic steering apparatus for rockets.

Patent the idea of a "step" or multi-stage rocket.

Offer a practical plan to explore high altitudes with rockets, and possibly shoot away from the earth.

Offer the first sound mathematical theory of rocket propulsion and flight.

Prove, mathematically and by actual test, that a rocket not only works—but works better—in a vacuum, and so can operate in space.

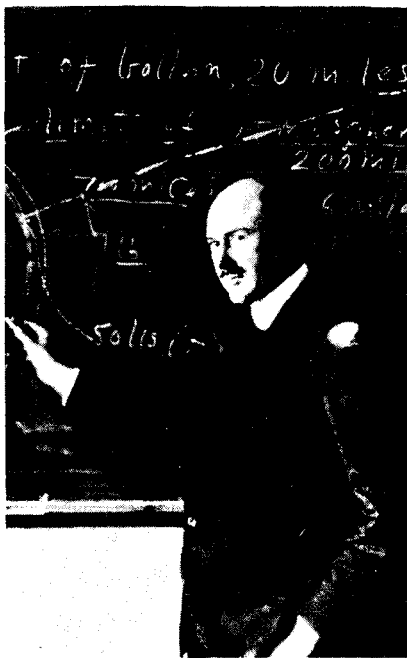
Goddard's records, carefully kept through the years, reveal the exhaustive labors that went into one momentous breakthrough after another. They also reveal disappointments which would have discouraged a less optimistic and happy man than Goddard. Typically, in the midst of a difficult research problem, he once said to his wife: "If it were easy, someone would have done it long ago."

Born in Worcester, Massachusetts, on October 5, 1882, Robert Goddard was a quiet, serious-minded youth who soon showed

the quick, probing mind of the scientist. One of the first areas of scientific exploration to draw his attention, and one which was to hold it with increasing devotion throughout his lifetime, was the possibility of reaching great heights—even space itself—through rocket power.

OVER 60 years ago, in 1899, the 17-year-old Robert Goddard began his first serious theorizing about rockets. From 1904 to 1908, as a student specializing in physics at the Worcester Polytechnic Institute, he continued to make systematic notes of ideas that might make possible the attainment of great altitudes, among them the use of the magnetic field of the earth, electric guns, the repulsion of charged particles, artificially stimulated radioactivity, streams of ions and solar energy. He was graduated from the Institute in 1908 with a B.S. degree, and entered Clark University at Worcester, from which he received his master's degree in 1910 and his Ph.D. in 1911.

Goddard's first real thrill of discovery came while he was a research fellow at Princeton University in 1912-13. His calculations showed that relatively little fuel was needed to lift a payload to great heights by rocket power, if a motor could be devised to use fuel efficiently. These computa-



tions were later to form the basis of a paper entitled "A Method of Reaching Extreme Altitudes," published in 1919 by the Smithsonian Institution as one of two classic papers in which Goddard laid the foundation for nearly all of today's developments in rocketry and jet propulsion.

After returning to Clark in 1914, the young physicist experimented in earnest the following year, starting with ship's rockets and continuing with others which he made himself. Two years later the Smithsonian Institution came to his aid with a small grant of funds to carry on his work.

When the United States entered World War I in 1917, Dr. Goddard volunteered his services and was assigned to explore the military possibilities of rockets. He developed a trajectory rocket which fired intermittently, with charges injected into the combustion chamber like cartridges in a repeating rifle. He also developed several types of projectile rockets to be fired at tanks and other objectives from a launching tube held in the hands and steadied by two legs.

These weapons were demonstrated to representatives of the Signal Corps, Air Corps and Army Ordnance at Aberdeen Proving Grounds on November 6 and 7, 1918. The demonstrations were successful, but a few days later the Armistice ended the war and the Army shelved the weapons. It was not until World War II that Goddard's projectile rocket, available in 1918, was dusted off and emerged as the now-famous "bazooka."

FOLLOWING THE WAR, publication of his historic paper, "A Method of Reaching Extreme Altitudes," aroused considerable attention, some of it scornful. The *New York Times*, which was to praise Goddard's work a decade later, ridiculed his contention that a rocket would work in a vacuum.

That Professor Goddard with his "chair" at Clark College and the

countenancing of the Smithsonian Institution does not know the relation of action to reaction, and of the need to have something better than a vacuum against which to react—to say that would be absurd. Of course, he only seems to lack the knowledge ladled out daily in high schools. But there are such things as intentional mistakes or oversights, and, as it happens, Jules Verne, who also knew a thing or two in assorted sciences—and had, besides, a surprising amount of prophetic power—deliberately seemed to make the same mistake. . . .

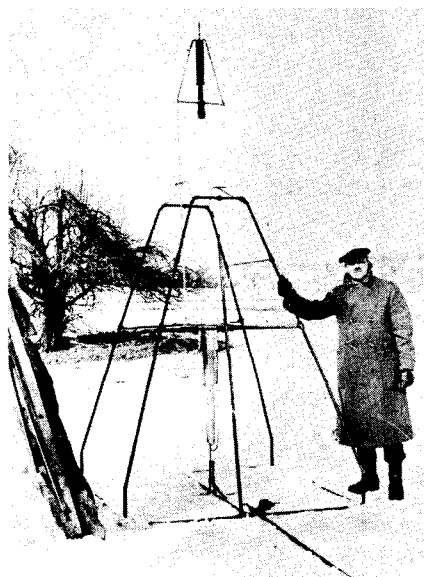
Despite such gibes, Goddard pushed doggedly ahead. During this period one of the most significant events of his life took place—his marriage on June 21, 1924, to Esther Christine Kisk. This attractive and able young woman, who had been associated with him in his work, was destined to play an increasingly vital role in her multiple capacity as wife, research assistant, secretary and official photographer of her husband's rocket experiments.

For the most part, Goddard's tireless work during the twenties attracted little interest. But toward the end of the decade, what may yet prove to be the most momentous rocket shot in history took place.

On July 17, 1929, in a field near Auburn, Massachusetts, Goddard fired a liquid fuel rocket whose repercussions, much wider than the quiet professor wished at the time,

will continue to be felt for centuries.

The 11-foot rocket rose with a roar to a height of 90 feet, nosed



over and traveled horizontally for 171 feet before returning to earth. It was a successful shot, and Goddard was pleased. Not so the town-folk living nearby. In a dispatch the next morning, the *Times* reported:

The noise was such that scores of residents called Police Headquarters, saying that an airplane was on fire. Two police ambulances scoured the section looking for victims, and an airplane left Grafton Airport to aid the search.

Another paper headlined its story: "Moon Rocket Misses Target by 238,799½ Miles."

THE DISTRESSED PROFESSOR also found himself under investigation by the Massachusetts State fire marshal, who frowned on further shots with such an infernal device.

Luckily, one of those who read of this fateful shot was Charles A. Lindbergh. The imagination of the nation's number one hero of the day was stirred sufficiently to bring him to Worcester to see what Goddard was up to. Deeply impressed, he reported what he had seen and heard to his friend Harry F. Guggenheim, a Navy flier in World War I, and president of The Daniel Guggenheim Fund for the Promotion of Aeronautics, endowed and named for his father, Daniel Guggenheim, who was an ardent supporter of aviation research and development. Harry Guggenheim, then serving as U.S. Ambassador to Cuba, suggested that Lindbergh meet with his father. Daniel Guggenheim's imagination was stirred, as Lindbergh's had been, by the rocket experiments. As a result Dr. Goddard was granted funds which enabled him to buy badly needed equipment and take a two-year leave from Clark to carry on his work.

Searching for an open area where rockets could be shot without endangering lives and property, Goddard settled on the Mescalero Ranch near Roswell, New Mexico, and proceeded to make history. As it later proved, when the United

States entered World War II using the comparatively primitive application of solid-propellant rocket power which Goddard had developed nearly a quarter of a century earlier, the history which Goddard was making had attracted far more attention in Hitler's Germany than it had at home.

Regarding the early struggles of Goddard and his few staunch supporters to win recognition for rockets from the U.S. Armed Forces, Harry Guggenheim recalls that he arranged early in 1940 for Goddard and himself to meet with the Chiefs of Army Ordnance, the Army Air Corps and the Navy's Bureau of Aeronautics, in order to place all their research, developments, patents and organization at the government's disposal. He recounts,

After a sympathetic reception, we were asked to present our project in detail to their representatives at a joint conference on May 28, 1940. On hearing our story, the representative of Army Ordnance said: "All very interesting, but we don't think rockets will play any part in this war; we believe that this war is going to be fought with the trench mortar."

However, the representatives of Naval Aviation and the Army Air Corps said they thought there might be a specialized field in which Dr. Goddard's work could be useful—jet-assisted takeoffs. And throughout the war Dr. Goddard was almost entirely restricted to

the development of JATO for the Navy and the Army Air Corps.

AS WE KNOW NOW, the Germans at this time were well advanced in developing what ultimately became the V-2 rocket. But the irony of this situation became apparent four years later. According to Guggenheim,

In December, 1944, a few months after the V-2 began falling on London, Goddard visited me at Mercer Field, New Jersey, where I was then stationed as commanding officer of a Naval Air facility. He gave me a photograph of one of his pioneering liquid fuel rockets taken in the spring of 1941, and pointed out the features in common with the V-2. I was so startled by the similarity that I turned the photograph over and asked him to put a brief inscription on its back. Dr. Goddard wrote: "Rocket produced in New Mexico in the spring of 1941, under the Daniel and Florence Guggenheim Foundation. It is practically identical with the German V-2 rocket.

Thus, by the spring of 1941 Goddard had succeeded almost single-handedly in building a rocket nearly identical with that which the Germans, working since 1929 on military rockets as an official Army project, developed about 18 months later. This rocket is now on display at the National Air

Museum of the Smithsonian Institution in Washington, D.C.

Robert Goddard died on August 10, 1945, after a throat operation. If ever a man had the right in his last days to say to his fellow countrymen, "I told you so," it was Goddard. But he was not the man to hurl recriminations for the apathy that had greeted his own work. His concern lay, rather, in doing what he could to make sure that those who followed would not be similarly ridiculed and ignored.

A number of memorials to Goddard's genius exist today, among them Robert H. Goddard Professorships at the Guggenheim Jet Propulsion Centers at Princeton University and California Institute of Technology. But the most eloquent testimonials are the modern descendants of the Goddard rocket, such as the Vanguard and Jupiter-C with which the United States sent earth satellites spinning into space.

"Tomorrow the world!" Such was the vain boast of Nazi Germany, which first incorporated Goddard's ideas about high-altitude rockets into a workable weapon of war. With far more truth and modesty, a fitting epitaph for the father of space flight might well read: "Tomorrow, other worlds."

The greatest service that could be rendered Christian people would be to convert them to Christianity.—*Valor*.

IN THE MERCURY'S OPINION INTELLIGENT BREATHING BRINGS YOU HEALTH!

by Russell Maguire

YOUR HEAD weighs about 15 pounds. Why don't you use it? Learn to breathe intelligently from the lower diaphragm. Great healing powers reside in proper breathing. Dr. Copeland said, "It matters little when you take up the practice of proper breathing: you automatically **EXTEND** your span of life from five to 30 years."

Breathing serves a twin purpose. It is just as important for the body to get rid of its wastes as to supply it with oxygen. With each inhalation oxygen flows into the lungs. With every exhalation, ever-present wastes are expelled from the lungs. From the lungs oxygen is borne by the red cells in the blood to every part of the body. By the act of expiration, the unwanted gases and toxins are blown out through the nose or mouth.

A 20 to 30 minute walk daily is all you need to keep you fit, if you breathe scientifically while you walk. Living will always be an art, and one of the greatest arts of life

will be the knowledge of breathing for health, youth maintenance and a longer span of life.

Wise men in the East say, "Life is from breath to breath and he who half breathes half lives." The ancient Egyptians used conscious breathing, curative methods thousands of years ago.

Intelligent, natural, slow breathing will bring you inner calmness of mind, heart and consciousness. At least twice a day inhale gulps of air through your mouth and forcefully exhale it through your mouth. Dr. Alexander Cannon, the great Tibetan breathing scientist, informs us in his books that Breathing Masters of Tibet live for more than 200 years.

Breath control means more youth for you. Try it! We will inform you regarding scientific breathing in another issue. Only one person in 400 breathes properly. Don't take sleeping pills. Among other reasons, they prevent your body from naturally disposing of