

THE FOCAL POINT

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TABLE OF CONTENTS

The One Dream Man: Robert H. Goddard	1
Villa Rica Notes	3
The President's Soapbox	3
Designation Of Noon And Midnight	4
Program Preview	4

CLUB CALENDAR

Next Meeting: November 17, 8:00 p.m. at Fernbank Science Center.

Program: We will see the planetarium show "Space Bound", then weather permitting, observe through the 36 inch telescope. Meet at the planetarium entrance at 7:45.

Observing Party: November 25 at Villa Rica. If we are rained/clouded out, then we will try December 2.

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Submissions: Article submissions are welcome, and may be delivered to the editor for consideration. Articles on computer floppy disk are encouraged.

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THE ONE DREAM MAN: ROBERT H. GODDARD, ROCKET PIONEER

by Larry Klaes

When telescopes were introduced into astronomy during Europe's Renaissance, they revolutionized humanity's oldest science. Earth's Moon was shown to be no longer a smooth, reflective disk as once believed, but a crater-scarred, mountainous world not far removed in constitution from the planet it orbits. The other planets, once no more than bright points of light in the night sky, were now shown to be worlds themselves, all displaying discernible disks, some with phases, others with surface features, and even possessing retinues of moons.

But as good as Earth-based telescopes have become, they still cannot present to us the truly close-up, detailed views of the other planets in the Solar System, neither can they give us direct samplings of these worlds' atmospheres and minerals, nor can they bring humans themselves to these places for exploration and colonization. Such abilities required the advent of the rocket to place our astronomical instruments and people in space. All this came about due to a rather private, driven, frequently ill New Englander in the first half of the Twentieth Century.

Robert Hutchings Goddard (1882-1945) is looked upon as one of the three main founders of modern rocketry, along with Konstantin Tsiolkovsky (1857-1935) of the Soviet Union, and Hermann Oberth (born 1894) of Germany. What makes Goddard stand out is that he went beyond just theorizing about various rocket designs and actually built working models. In fact, Goddard launched the first liquid-fueled rocket (the forerunner of most rockets used in today's various space programs) in Auburn, Massachusetts, on March 16, 1926. The flight lasted just 2.5 seconds, reaching an altitude of 12.3 meters (41 feet) and landing (crashing, actually) 55.2 meters (184 feet) from the launch site in his Aunt Effie's cabbage patch. Today the launch site is commemorated with a small monument surrounded by a busy street and numerous stores, including the Auburn Mall.

Goddard belonged to the league of misunderstood geniuses who was most certainly ahead of his time. As a teenager growing up in Worcester, Massachusetts (about eighty kilometers/fifty miles west of Boston) he dreamed of sending spacecraft to orbit and photograph the planet Mars at a time when many people didn't even know what Mars was; and sadly this is still true in some cases today.

Goddard attended and eventually graduated from Clark University in Worcester, where he earned a degree in mechanical engineering. Later he taught physics at Clark and began to assemble, from among his students, those who would work with him later on. Goddard sustained his rocketry work with grants from the Smithsonian Institution in Washington, D.C.. He always preferred to think of rockets in terms of space exploration. However, to stay viable, he also attempted to sell the idea of rocket-borne weapons to the United States Army.

In 1920, the Smithsonian Institution published Goddard's

paper on rocket concepts, "A Method of Reaching Extreme Altitudes", in the Smithsonian's Miscellaneous Collections (Volume 71, Number 2).

Always concerned about being rejected as an "outlandish misfit", Goddard tried to protect his meager funding by remaining very conservative in print. After discussing some rocket fundamentals, he described the rocket's potential for exploring Earth's upper atmosphere directly.

Towards the end of his article, Goddard began to hint at his thoughts for the future by detailing his plans for launching a small, unmanned rocket that would be sent to Earth's Moon, wherein it would strike the surface and explode its payload of flash powder, so that observers with telescopes could see where the rocket had landed. Goddard was cautious not to mention flights to Mars or any other planet, as any celestial object beyond the Moon was considered by many scientists at that time to be too far away from Earth to ever be reached by humans, and general opinion on journeys to the Moon fared little better.

Although published in a journal virtually unknown to the general public, "A Method of Reaching Extreme Altitudes" did not go unnoticed, but it brought about the kind of attention Goddard did not want at all: Regular daily newspapers grabbed his ideas and practically announced that the Massachusetts scientist would be sending a manned expedition to the Moon within a few years! The prestigious NEW YORK TIMES dismissed Goddard's ideas and said that he didn't even possess an elementary knowledge of physics. The TIMES' editor incorrectly thought that rockets could not work in space. He thought the exhaust from the vehicle would have nothing to push against; he did not realize that the rocket exhaust would be acting against the inner walls of the rocket itself, thus creating the required reaction (The TIMES did not make a retraction of this error on their part until the day APOLLO 11 landed Neil Armstrong and Edwin Aldrin on the Moon in July of 1969!).

Mary Pickford, the famous silent screen film actress, asked if she could put a letter in the non-existent Moon rocket; one man insisted that if Goddard paid ten thousand dollars for the insurance, he would fly to either the Moon or Mars without any other provisions.

Goddard was a very private man. This overblown attention was one of his worst fears come true. He was also justly concerned of rivals stealing his ideas and claiming them for their own. Goddard later commented that he should have written about his plans for a Mars mission, as then it would have been deemed ridiculous and he would have been left in peace. Although it came close to causing him to lose his funding, eventually the publicity would reach the right people who would help Goddard finance his dream of rocket research.

In 1929, a particularly loud rocket test in Auburn, Massachusetts had neighbors believing an airplane had crashed, so they called the police and fire department, who - along with the press - rushed to the scene, only to find Goddard and his assistants gathering up the pieces of a wrecked rocket and putting out small grass fires.

Even though the incident was really a test with the crash of the rocket fully expected by Goddard and his team, the press had a different point of view and played it much differently: One of

the most painful headlines told about Goddard's rocket missing the Moon by "only 238,799 1/2 miles!" After this event, Goddard was asked by the local authorities not to fly rockets in the area again, as it was deemed far too dangerous, particularly in a residential area (this was a legitimate concern). Goddard reluctantly took his project to Hell Pond, a desolate federal artillery range at Camp (now Fort) Devens in Ayer, Massachusetts, where he conducted a number of static firing tests for several months.

Fortunately for Goddard, he did not have to dwell at the range for long: Aviator Charles Lindberg - who had become quite famous for crossing the Atlantic Ocean on his own in an airplane two years earlier - took an interest in Goddard's concepts and decided to help finance his work on rockets. As an interesting note, Lindberg was introduced to Goddard by one of the rocket pioneer's own students and a former associate of the Wright Brothers: Edwin Aldrin, Sr., father of Edwin "Buzz" Aldrin, Jr., the astronaut who landed on the Moon with Neil Armstrong in APOLLO 11 on July 20, 1969, and became the second human being to directly explore another world.

Lindberg also convinced philanthropist Daniel Guggenheim to help fund Goddard and move his entire operation to Eden Valley near Roswell, New Mexico. There Goddard could test his new developments in the comparative safety and peace of the wide open desert. Goddard's research would be a prelude to the thousands of rocket tests which would be conducted in that part of the United States in the decades to follow, all descended from the launch of that primitive liquid-fueled rocket on a farm in Auburn in 1926.

Here in the desert, Goddard did some of his best work, testing parachute systems to recover rockets and their payloads, constructing stabilizing fins and gyroscopes to keep rockets flying straight, and even putting simple meteorological instruments aboard some flights to study the weather. During this entire time, Goddard's staff never numbered more than seven people: Five machinists (some of whom hadn't even graduated from high school), his wife Esther (who took the photographs and extinguished fires), and Goddard himself. The man who wrote about rockets to the Moon never got any of his rockets higher than 2,250 meters (7,500 feet), though distance was only one of many important aspects of his rocket development.

Despite all this work, Goddard and his rockets were generally unknown to the American public, and many of his ideas went unrecognized until several decades after his death in 1945. Ironically, his ideas did not go unnoticed by the Germans, particularly Wernher von Braun, who took Goddard's plans from various journals and incorporated them into building the A-4 series of rockets - better known as the V-2 - which constantly struck at Europe in the last two years of World War Two. The Army also adopted only one major and direct facet of Goddard's concepts in his lifetime, the antitank weapon known as the bazooka. Eventually, the United States Patent Office would posthumously recognize 214 patents in all for various rocket designs invented by Goddard.

Goddard was visionary in his dreams for space travel: Nuclear and ion-powered rockets, solar-powered satellites, solar sails, even methods for communicating with extraterrestrial

intelligences. The proposed (but never built) American probe to Comet Halley in 1986 had incorporated in two of its design plans ion power and solar sails as possible methods of propulsion to reach the comet. Goddard even felt that rockets would also pave the way to save the human race in the far distant future when Earth's Sun will begin to expand into a red giant star and envelope Earth, vaporizing it along with Mercury and Venus. He proposed that humanity use its no doubt advanced skills to construct habitats inside large planetoids (less correctly known as asteroids) and then propel them out of the Solar System using some distant descendants of his primitive rockets to other, still viable star systems, where humans could find new planets to live on and continue the existence of the species.

Today, Goddard's designs and dreams have either become realities or at least well-used plot concepts in science fiction. Because of his work, we have been able to study lunar minerals first hand, search Mars for signs of life, find active volcanos and frozen oceans on the moons of Jupiter, and view the Milky Way and other galaxies with a clarity unavailable within the turbulent atmosphere of Earth. As rocket expert Jerome Hunsaker said of the man from Worcester, "Every liquid-fueled rocket that flies is a Goddard rocket."

Some recommended reading:

Anne Perkins Dewey, ROBERT GODDARD: SPACE PIONEER, Little, Brown and Company, Boston, 1962, Library of Congress Catalog Card Number 62-8309 (hardcover).

Milton Lehman's 1963 biography on Goddard, THIS HIGH MAN, was reprinted in 1988 by Da Capo Press, New York, with the title ROBERT H. GODDARD: PIONEER OF SPACE RESEARCH, ISBN 0-306-80331-3 (paperback).

Another book (actually a multi-volume work) on Goddard's work is THE PAPERS OF ROBERT H. GODDARD, edited by G. Edward Pendray and Esther C. Goddard, McGraw-Hill, New York, 1970.

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VILLA RICA NOTES

by Steve Gilbreath

Good news from Villa Rica! Our power has been restored thanks to George Stephens and Walter F. Barber, Sr. Thanks guys!. Once again we can gaze at the heavens without having to power our telescopes with our car batteries. Electricity also makes the warm up shed a nicer place too.

On another note the combination locks at Villa Rica observatory have been changed. This is necessary to keep our site and equipment secure. Contact one of the club officers to find out the new combinations.

And finally, our observing party. We will hold an observing party at Villa Rica on Saturday, November 25. If the weather doesn't cooperate plan on Saturday, December 2. Winter nights in the country tend to get a little cold so dress warm. In fact it might be a good idea to review *The Observer's Etiquette* in the May 1989 issue of the *Focal Point* for other fine pointers for comfortable observing. As an added bonus, Leonard Abbey will be on hand with his telescope to show everyone the "best view of Jupiter they've ever seen."

THE PRESIDENT'S SOAPBOX

by Leonard Abbey

The Board of Directors met on Monday, October 16, 1989. The following decisions were made:

DUES: The dues structure of the club has been completely overhauled. There are now three classes of membership.

Family	\$35
Student	\$25
Honorary	Free

Both individual and educator memberships have been abolished. The net effect is that when one member of a family joins, the other family members are also considered to be members of the club. A student member is defined as a person who is a bona fide full-time student. The new rate structure will go into effect after the November meeting.

This decision, which in effect raises our dues by \$10, was not arrived at lightly. We have been living very close to the wire, asking only for the money for which there was an actual and present need. We have held our dues constant for almost ten years, and we have absorbed the last two rate increases from *Sky & Telescope*. But we are now anticipating another increase from ST, and the time is coming when we will need some cash to make long-overdue repairs on our observatory. We will also need to begin the lengthy (and expensive) search for a new location.

OBSERVATORY: It has become apparent that the city lights will sooner or later destroy the dark skies of Villa Rica. While this is some time in the future, and our observatory will be useful for years to come, it is now time to decide how we are going to handle the encroachment of downtown lights.

A Planning Committee has been formed to evaluate our options. This committee is headed by Don Hall. If you are interested in serving on the committee, or would like to submit comments to it, please contact Don. No changes are contemplated for the immediate future, but responsible planning requires that we begin to work now.

DESIGNATION OF NOON AND MIDNIGHT

by Frank Narmer

A question frequently asked is whether 12 a.m. and 12 p.m. should be used to denote noon and midnight, respectively, or vice versa. The answer is that these abbreviations should not be used. They will cause confusion.

The abbreviation 12m is sometimes used to denote noon (m denotes meridian). However, 12m is likely to be interpreted as an abbreviation for midnight. Hence, 12m should not be used either.

The following are three solutions to the problem of designating noon and midnight unambiguously:

1. Use the complete words "noon" and "midnight". If midnight is used give the two dates between which it falls. Thus, for example, "midnight of 21 September" is ambiguous but "midnight of 21/22 September" is specific.
2. Prepare schedules with times other than noon and midnight. Use times such as 12:01 AM, 11:59 PM, etc. This is done by railroads.
3. Use the 2400 system, which is used by international airlines and the military services. The first two digits give the hours past midnight and the second two give the minutes. Noon is designated by 1200. Midnight is designated as 0000 of the new date, i.e., midnight of 21/22 September is 0h, 22 September.

NOTE:

It has often been proposed to decide by law or regulation the proper designation of noon and midnight. This has in fact

been attempted. This has not, however, removed the ambiguity and resulting confusion. The Government Printing Office Style Manual states that noon is 12AM. All the digital watches, however, disregard this and switch to PM at the moment they come to 12:00:00. It is clear that a regulation is powerless to override an inherent ambiguity.

PROGRAM PREVIEW

by Eugenia Abbey

For our November 17th meeting we can look forward to a very exciting planetarium program at Fernbank Science Center, Space Bound. The show follows the progress of the manned space program from the early Mercury program, through the Apollo moon landings and Skylab, to today's space shuttle. A look at possible next steps are explored as well.

Those of you who remember the heart-stopping first lift-offs will enjoy reliving a unique moment in history when man first broke the bounds of earth's gravitation. For members too young to remember, this outstanding show will make you feel as though "you were there." The simulated moon landing as seen from inside the lunar landing craft is extremely realistic.

Combining film footage, slides and animation, Space Bound is easily understood by children while equally exciting for adults. By special arrangement, the Atlanta Astronomy Club, including family members and guests, will be admitted free of charge. (Children under 5 years are not admitted to the planetarium.) Weather permitting, we can look forward to viewing through the 36" telescope after the program. Come and bring the family!

THE FOCAL POINT

First Class Delivery



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