

## **Early Rocketry                  Part 5**

### **Germany - 1922-1932**

#### **Hermann Oberth -The Rocket Prophet**

#### **The Woman in the Moon, Days of Innocence**

Early German rocketry followed a similar pattern to the Americans – an enthusiastic amateur group, eager to put their dreams into practice, and in parallel an influential theorist – in America Robert Goddard ( Touchpaper Winter 2012 ) and in Germany Hermann Oberth – with a major difference - Goddard enjoyed success in practical rocketry, Oberth remained a theorist.

The phraseology Days of Innocence reflects the untarnished enthusiasm of the early band of amateurs up to around 1932, before early German rocketry took a markedly sinister turn.

#### **Hermann Oberth and the beginning**



**Hermann Oberth  
Leading theorist of European  
rocketry**

Hermann Oberth was born in 1894 in Transylvania - at that time, Austro-Hungarian territory but later after WW1 Romanian. Some parts of Transylvania had been settled by Saxons and Oberth and his parents were German speaking. Their circumstances were comfortable, Oberth's father, a doctor, having founded a private sanatorium.

Following his father's wishes Oberth went to Munich University to study medicine. However he had been gripped from an early age by stories of space travel and the additional optional subjects he chose - mathematics, astronomy and physics, reflected this. WW1 intervened. After service in the Austro-Hungarian Army Oberth went to the University of Heidelberg, but the war had enabled him to free himself from his father's influence and he devoted all his energies to developing a theory of space travel, the supposedly subsidiary subjects now occupying all of his time.

So much so that by 1922 after prodigious study he had developed an astonishingly sophisticated theory in considerable detail to back up the idea of a projectile leaving the earth's atmosphere and travelling into outer space - the projectile being a rocket, the only kind of power that could operate in the oxygen-free space beyond the earth's air. This was done without any knowledge that others might be working along the same lines, so Oberth was startled to hear of the publication of Goddard's book 'A Method of Reaching Extreme Altitudes'. However he was encouraged to see that Goddard envisaged only the carrying of a sufficient quantity of flash powder to be seen from earth on impact whereas Oberth had progressed to postulating, with appropriate scientific argument, that actual passengers could be carried to the moon.

The fuel to be employed was of course critical and here Goddard had equalled Oberth in concluding that the fuel would have to be liquid - solid propellant being inadequate for the exhaust velocity demanded. Oberth envisaged a petrol fuel and liquid oxygen oxidant.

The young researcher, who in the meantime had married and

qualified as a teacher in order to provide an income, then set about the thankless task of persuading sceptical publishers that his book 'The Rocket into Interplanetary Space' was worth publishing. Not surprisingly with scant success until he found one who reluctantly agreed to bring it out if Oberth paid the printing bill. To the complete astonishment of both publisher and author the book was, bearing in mind the content which made little concession to the reader, a quiet sensation. The first print was snatched up and the second was all sold by advance order before it was even printed.

In fact most readers probably skipped the first two sections of the book, containing abstruse calculations, but almost by accident Oberth captured them with his third section- the concept of a space ship.

In 1925 Oberth took up a mathematics teaching post in Transylvania to support an already growing family. However, although not obvious at the time events were moving towards the start of the Age of Rocketry. Oberth's book had gripped the imagination of two gifted scientific writers – Willy Ley and Max Valier. The latter offered to put Oberth's book, using his journalistic skills, into a palatable form and the result 'A Dash into Space' sold steadily. Then Ley similarly produced a volume aimed at the general reader and arguably superior to Valier.

Insidiously rocketry was beginning to seep into the public consciousness. However it was one thing to capture the imagination of the public with a vision of man voyaging into space but a completely different matter to persuade any hard headed businessman to put his money into actual physical construction of a rocket.

## **Oberth and The Woman in the Moon - 1929**

In the meantime Oberth laboured on, producing the first volume of a more readable version of his first book. Then out of the blue in 1928 came an astonishing offer. He received an offer to go to Berlin to act as technical advisor to the famous film director Fritz Lang who was embarking on the first film ever made to describe the voyage of a

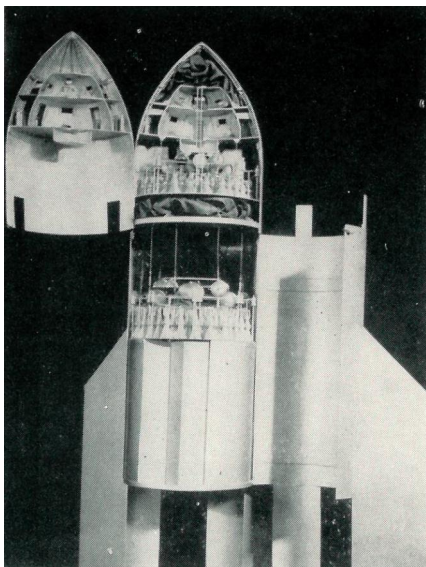
rocket through space. Lang was a shrewd judge of public taste and realised that rocketry should have a glamorous aspect and so the film was entitled 'The Woman in the Moon' (when shown in the UK).



Oberth accepted with alacrity, obtained leave of absence from teaching and set off for Berlin. Lang had already been developing his ideas. He was genuinely interested in rocketry and approached the film's makers UFA with a proposal that they should finance the building of an actual operational rocket. Admittedly the intention was publicity but behind that Lang was well aware that it would considerably enhance more serious research.

UFA agreed to back the idea, but what initially seemed to be a dream situation in fact turned into a nightmare.

Oberth was given an impossibly tight dead line, the opening night of the film, and did not have the physical or staff resources to carry out the project. In spite of feverish effort without any knowledge of Berlin he could not find in time the skilled metalworkers necessary to carry out manufacture of his 6 foot torpedo shaped rocket. Part of the exercise was parachute recovery of the rocket. Much valuable time was expended in wrestling with design and manufacture of the release mechanism. The upshot was that he ended up feverishly trying to construct a kind of alternative hybrid with a carbon stick fuel. Even this was not completed in time and Oberth, practically suffering a nervous breakdown, fled the pressures of Berlin, returning exhausted to Transylvania.



Cutaway model of the  
'space ship' designed by  
Oberth for the film



Taken during filming – Oberth first  
left, Willy Ley last on right

With hindsight all was not lost. Lang correctly portrayed Oberth's theories, 'The Woman in the Moon', premiered in 1929, was a great success and it remains as a lasting landmark in the public history of early European rocketry.

Oberth must have been chastened by his experience in Berlin. However in the same year his reputation received a substantial boost. The French aviation manufacturer and rocket enthusiast Esnault-Pelterie and a wealthy banker Andre Hirsch had instituted an international prize for achievement in the new science of astronautics (Touchpaper Autumn 2012) and Oberth was the recipient of the first award, for the publication of the second edition of his book.

In practical terms Oberth had failed. However his effort to design and manufacture a functioning rocket played a major part in presenting rocketry to a mass audience and stimulated the efforts of a growing group of enthusiasts, later to become the VfR.

## **Fritz von Opel's rocket experiments – undesirable diversion or useful publicity ?**

Whilst Oberth was enduring his experience in the film world a very different essay in rocketry was taking place in Germany. Solid propellant rockets had in fact been in use for some time mainly to aid ship to shore rescues by projecting cable and in signal use. The main manufacturer was Friedrich Sander and in 1928 he and Fritz von Opel, the car manufacturer, attracted by the publicity value, undertook trials of a car powered by Sander rockets. Max Valier, the author of the more readable version of Oberth's book, had instituted the connection with Sander. He had become a member of the VfR and incurred some hostility within the organisation because of what were regarded as frivolous experiments. The first car, with 6 rockets, RAK 1 successfully ran at 47mph. The rocket clusters were progressively increased to 24 in RAK 2, containing 265lbs. of propellant, achieving 143 mph on 23rd. May 1928.

Whilst successful in terms of sheer speed the rocket cars had little practical value and Opel, having achieved his publicity aims, abandoned them.

The VfR frowned on Opel's efforts, regarding them as cheap publicity stunts and vulgarisation of the purity of their aim to put a man into space.

Opel however did later succeed in putting a rocket plane into flight and there are grounds for arguing that he could have made a contribution. However the 1929 stock market crash and the rise of Nazism ended his dreams and he later went to live in Switzerland.

Valier continued with the rocket car and also rail experiments and early in 1930 successfully tested RAK 7, a liquid fuelled – liquid oxygen and petrol, rocket car, the first in the world. Sadly later in the year he died when one of his liquid fuel rockets exploded.



RAK 2 Rocket car

Apart from publicity value to von Opel, rocket cars were in terms of technological development a dead end, capable of running only in a straight line, although again at this stage any heightening of general awareness had some value.

## **The Society for Space Travel VfR – Verein für Raumschiffart**

In 1927, inspired by Oberth's book, a group of enthusiasts founded the Society for Space Travel – VfR.

Their aim was to put Oberth's theories into practice and actually build a functioning rocket which would test his theories and promote their development.

Johannes Winkler was their first president. Several others were invited to join by mail and accepted – Oberth himself, Willy Ley, Max Valier, Walter Hohmann, who like Ley and Valier had written a book on space travel. Even more momentous although unknown at the time, in the same year an eager young student joined – his name Wernher von Braun.

They published a journal, 'The Rocket' and like Oberth hoped that by raising general consciousness they might find some businessman or foundation to finance their efforts.

## **The rocket becomes reality**

An ex WW1 aviator, Rudolf Nebel had assisted Oberth in his struggle with the film company rocket and he put forward the idea that they should start with a small liquid fuel rocket.

This was partly based on some encouragement they had received from the German Post Office who were interested in the possibility of rocket carried mail.



## **Mirak**

Aided by a new recruit Klaus Riedel, Nebel constructed his rocket – the Mirak, based on the abbreviation of the words for very small. Mirak harked back to Congreve in that it was a cylinder with a guide stick. The stick was an aluminium tube which carried petrol fuel. The cylinder formed the oxygen tank into which liquid oxygen was poured. On the bottom of the cylinder was a small copper combustion chamber which was almost surrounded by oxygen. The rudimentary rocket therefore incorporated two principles which would be carried forward in later development – oxygen pressure raised by motor's heat to force liquid oxygen into combustion chamber and oxygen absorbing some of the motor's heat, thus keeping the motor at a safe temperature.

Mirak was tested, tethered on the ground in a farm field and it worked. It later blew up but the valuable evidence had already been gained of its practicability.

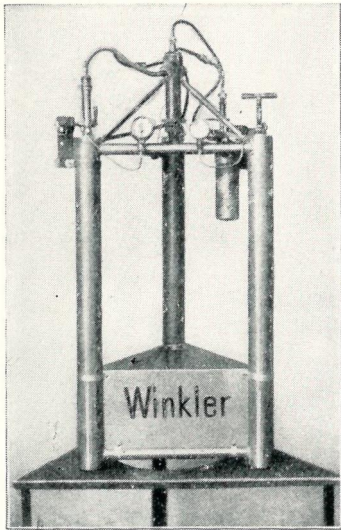
## **The Rocket Airdrome - Raketenflugplatz 1930**

Riedel wrote a report for the Society bulletin and jubilation ensued when two businessmen came forward with donations and offers of further financial assistance.

Nebel immediately began a search for a more suitable testing ground and chanced across a deserted WW1 ammunition storage area, complete with traverses suitable for test chambers. The local authority owned the area and raised no objection to the Society's leasing it. So was born what was to be christened the Rocket Airdrome – a magnet for enthusiasts, many of whom took up residence, being out of work and homeless in the economic depression.

## Mirak II

Nebel and Riedel lost no time in pressing on with Mirak II. They were helped by a successful effort to persuade manufacturers to send any surplus material, tools etc. to the Airdrome, which had resulted in a



### Johannes Winkler and his rocket

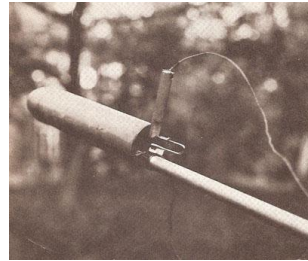
valuable resource. Tests continued unabated in an increasingly heady atmosphere. Mirak II blew up in 1931, but the eager experimenters merely pressed on with redoubled vigour.

First successful liquid fuelled rocket launch – 14th. March 1931

In the meantime Johannes Winkler had been working independently and on 14th. March 1931 achieved the first successful liquid fuelled rocket launch in Europe.

Winkler's achievement spurred the main VfR group to fresh effort – Mirak III..

## Mirak III – 10th. May 1931



### Mirak

Mirak III was fuelled by petrol and liquid oxygen, with the petrol being driven into the combustion chamber by compressed nitrogen. To solve the problem of the intense heat generated by the burning fuels the motor had double walls built of heat conducting aluminium with the space between filled with continuously running cooling water – the test was static and this solution proved to be effective. The motor was suspended between two legs which acted as fuel tanks.

In Riedel's words 'the beast flew' – not very far, but far enough.

## **Repulsor I – 14th. May 1931**

Four short days later the enthusiasts had a repaired rocket ready. It was called Repulsor after the power system used by space travelling Martians in a novel which had influenced them in boyhood.

Some idea of the general level of control at this time is given by the fact that the switch controls were fastened to broom sticks which were pushed past protective sand bags.

After some wild wild careering Repulsor I reached two hundred feet.

## **Repulsor II – 21st. May 1931**

A week later Repulsor II was ready – with improved valves, aluminium hoops surrounding its legs and four base fins. The petrol supply was driven into the combustion chamber by compressed nitrogen, oxygen was fed in by its own gas pressure.

Repulsor II rose two hundred feet then went on to a horizontal course, towards a residential area, to the horror of the enthusiasts. However it smashed into a tree, having travelled one third of a mile.

## **The success of Repulsor IV - the ‘One-Stick’ Repulsor – late 1931**

Repulsor III crashed. But the Group were convinced they were on the right track and continued development of the Repulsor in an atmosphere of almost frenzied enthusiasm.

Demonstrating how history can repeat itself, following the principle established by Congreve 2 in the early 19th. century (Touchpaper June 2008) the new model had a centre line guide stick with all the parts grouped along a central axis.

The first Repulsor IV was a resounding success. soaring to 3300 feet. It was successfully recovered by parachute.

Later larger models reached altitudes over half a mile.

## **Invaluable publicity**

The fame of Repulsor grew rapidly, to the extent that the film company UFA, which had abandoned Oberth a few years previously, made a film of its exploits, sparking roars of excitement in the cinemas – rocketry was well and truly in the public consciousness.

## **End of the Days of Innocence 1932 - 1933**

The enthusiasts of the Racketenflugplatz could not escape the relentless rise in the outside world of the Nazi Party.

As the party extended its grip on German society the VfR crumbled, part allying itself with the new regime and many of the others taking jobs in Governmental organisations or in private industry which had begun to receive substantial Governmental orders. A further segment, among them Von Braun, were recruited by engineering officer Walter Dornberger, then Captain, newly appointed head of rocket development in the Army's weapons department, leading ultimately to the V2.

## **Oberth**

Oberth did not have a good war.

He was regarded with suspicion as he did not have German citizenship (a situation which was later remedied when the Gestapo gave him the choice of taking German citizenship or the concentration camp).

He was taken into Dornberger's organisation at Peenemunde but fell victim to professional jealousies and was side lined, to the extent that he was not included in the group of rocket scientists taken to America at the war's end.

In the late 1950's Oberth travelled independently to America where he continued to take a benign interest in interplanetary space travel.

**Hermann Oberth was the greatest theorist and visionary of early European rocketry and was instrumental in bringing rocketry into official and public consciousness.**

**His writing demonstrated a prodigious intellect and was an inspiration to those who actually sent the first rudimentary rockets on their erratic course into the sky, dreaming of travel into space, and remained a bible for subsequent developers.**

**Les Tucker**

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