

While I was busy in Göttingen, Frank and Hugh Dryden went to Munich, where another great aeronautical research center was being built. Most of the growing facilities were dispersed around the city, with one large wind tunnel (part of a group) being built in a suburb and another huge installation going up in the Austrian Tyrol in the Alps. Here was the largest wind-tunnel installation in the world, one capable of testing a complete jet-engine power plant. It was intended to operate up to the speed of sound, which would take 100,000 horsepower. When Dryden inspected it, the Germans were in the process of boring a tunnel into the mountain to bring down water to operate the turbines of the wind tunnel.

In the Munich area Dryden also came into contact with a group of about four hundred engineers and technicians, including Dornberger and von Braun. They had been evacuated from the Baltic base of Peenemünde and were housed in a hotel in Garmisch, where they were being interrogated. Dryden also found another group at nearby Kochel, headed by Rudolph Hermann,* which was in the process of building a new hypersonic tunnel that could develop a speed seven times the speed of sound. Dryden was quite impressed with the work of this group. They had done most of the aerodynamic work on the V-2. From them we learned that the Germans' transatlantic rocket, which had caused some fears in America, was only a design study supported by wind-tunnel tests, the idea being to take a V-2 rocket with its range of 200 miles and use it as a launching rocket for a smaller winged missile which would skip and glide to its target, as far as 3000 miles away. In fact, charts at Kochel showed trajectories to New York. This was the first evidence of a practical intercontinental ballistic missile and had a great impact on American thinking.

From these interrogations we also learned a great deal about the men behind the now well-known V-1 "buzz bomb" — whose code name, incidentally, was *Kirschkern* (cherry pit) because it was designed to be spit out against England — and V-2 long-range rocket at Peenemünde. Dr. von Braun, who headed the development section on the V-2, had been a student of Professor Hermann Oberth. Oberth never did anything serious about rockets except to make drawings. But these young fellows, who had been in a rocket society at the University of Berlin, were picked up in 1932 by General Walter Dornberger, who, as a captain in the army, had been given an ordnance assignment to develop rockets. Dornberger found a good ally in von Braun, whose imposing appearance and dramatic flair were helpful in selling this organization of rocket amateurs to the German government. Von Braun could impress

* Now a professor at the University of Minnesota.

a man like Hitler whereas Prandtl, a much superior scientist but less prepossessing personality, couldn't. I do not believe that all the statements that we heard in the course of the interrogation and found in documents were the absolute truth. Some of them had obviously been inflated for the consumption of the general staff in Berlin.

That Dornberger succeeded in creating a practical rocket is now well known. But the development of the V-2 was slow. On one occasion, in 1939, all the civilian employees of Peenemünde were drafted, and the only thing that saved the project was that Dornberger was able to persuade a few of his fellow generals to assign several thousand enlisted men to keep the project going. Several times priority was reduced. Even in 1942, the year of the first successful V-2 flight, it was said that Hitler was not in favor of the V-2 rocket because he dreamed it would never work. From October 1942 to the middle of 1943 there were 65,000 alterations in the drawings of the V-2 to get a production version. The Germans also said they built 5400 V-2's and fired 3600 of them against the Allies.

The Peenemünde group was more fortunate than a nuclear group in Göttingen. As I heard the story from a U.S. nuclear team investigating atom research in Germany, a group of physicists at Göttingen got the idea of a fission bomb from reading the famous 1939 paper of Otto Hahn, a great German physicist. This was the same paper that stimulated the American group and led to Einstein's famous letter to President Roosevelt, urging him to establish the A-bomb project. The Göttingen group thought they'd get millions of marks from Berlin for their A-bomb project. Instead Hitler flew into a rage. "Why waste money? Give me jets. Give me mines. By the time you work out this atomic energy, the world will be at my feet."

So they were thrown out of his office. In the United States, Roosevelt listened to Einstein and the story turned out to be quite different.


35: Russia and Hungary

A MONTH had gone by. We were nearing completion of our studies of German war research, when I received an invitation to attend the 220th Anniversary of the Soviet Academy of Sciences to be held in Moscow in June. I phoned General Arnold. Should I accept?

he is a sublime symbol in science of the creative individual who is both a theoretician and a practical engineer. Newton's contributions as the founder of many branches of physics are well known. In his universal law of gravitation he really saw the world as a harmonious unit in which every bit of matter was related to every other bit of matter. He led the way for generations of scientists to believe in, and seek to understand, the laws that dominate the destiny of the Universe. This, of course, was always a great stimulus to me, but I also relished the little-known fact that Newton could take time from his august theoretical researches to design the bridge over the River Cam behind St. John's, Cambridge.

The atmosphere for research has changed so radically since Newton's day, with the emphasis on organized collective government-financed research, that I was delighted to read in the *American Scientist** a description of what might have happened to Newton had he lived in a version of the present aerospace age and submitted to the King his idea for the study of the falling apple.

The author of this charming satire goes on to say:



After Newton was sworn to tell the truth and had denied that he was a member of His Majesty's Loyal Opposition, had never written any lewd books, had traveled in Russia, or had seduced any milkmaids, he was asked to outline his proposal. In a beautifully simple and crystal clear ten minute speech, delivered extemporaneously, Newton explained Kepler's laws and his own hypothesis, suggested by the chance sight of an apple's fall. At this point one of the committee members, an imposing fellow, a dynamic man of action, demanded to know if Newton had a means of improving the breed of apples grown in England. Newton began to explain that the apple was not an essential part of his hypothesis, but he was interrupted by a number of committee members, all speaking at once in favor of a project to improve apples. This discussion continued for several weeks, while Newton sat in characteristic dignity waiting until the committee wished to consult him. One day he arrived a few minutes late and found the door locked. He knocked circumspectly, not wishing to disturb the committee's deliberations. The door was opened by a guard who told him there was no more room and sent him away. Newton, with his logical way of reasoning, deduced that the committee did not wish to consult him further, and forthwith he returned to his college and his important committee work.

* James E. Miller, "How Newton Discovered the Law of Gravitation."

Several months later Newton was surprised to receive a bulky package from HMPBRD/CINI. He opened the package and found it contained a variety of governmental forms, each in quintuplicate. His natural curiosity, the main attribute of the true scientist, provoked him into a careful study of the forms. After some time he concluded that he was being invited to submit a bid for a contract for a research project on the relationship between breed, quality, and rate of fall of apples. The ultimate purpose of the project, he read, was to develop an apple that not only tasted good but also fell so gently that it was not bruised by striking the ground. Now, of course, this was not what Newton had in mind when he had written his letter to the King. But he was a practical man and he realized that in carrying out the proposed project he could very well test his hypothesis as a sort of sideline or byproduct. Thus he could promote the interests of the King and do his little bit for science in the bargain.

This satire is not as farfetched as it might seem. I recall being put in charge of an American research project, and at the end of the year we found we had not completed the task scheduled, but we had obtained other more interesting results which cast new light on certain problems of airplane design. The official in charge of the project, however, withdrew our funds because the contract had not been fulfilled. I told him that according to his theory Christopher Columbus had also failed. He had contracted with Queen Isabella of Spain to find a new sea route to India. Instead he discovered the continent where, I said, "you and I are having our discussion on the philosophy of research." The official must have been impressed with the analogy because he finally agreed to pay the sum contracted for. Fortunately for me, he didn't remember that Columbus was in fact put in jail by the Queen because of irregularities in the execution of the contract.

I should like to add in case of misunderstanding on this point that I am not expressing opposition to organized cooperation per se, only to bureaucratic excesses. I believe that pioneer work in science can be promoted less by organizing, contracting, and directing research than by creating the necessary climate and conditions in which it can thrive.

of names. The next day they were approved by the International Academy of Astronautics, which also agreed to Malina as chairman and Sir Bernard Lovell, Director of the Jodrell Bank radio telescope in England, as vice-chairman. Several members felt that it was too early to talk of a manned research center on the moon, not because of any technical difficulty in getting there, but because it was not clear without further experiment whether or not radiation and low gravity might be harmful to people over a long period. But the Committee was encouraged to go ahead anyway.

Little did we then imagine, as we left the restaurant, that a few months later (1961) President Kennedy would get Congress to approve his program to put an American on the moon by 1970, and make Malina's project not the leisurely affair he had envisioned but one of immediate interest and importance.*

After we land on the moon and set up a laboratory there, will we go on to the planets? I think so, at least as far as Mars and Venus, which under the most favorable conditions would take a pilot about a year for the round trip. On the other hand, I am quite pessimistic about our ever achieving interstellar travel. The nearest star — Alpha Centauri — is about 4.3 light-years away, which means that a traveler would have to travel over four years to reach it, even if he moved near the speed of light, which is not possible with present technology. Professor Eugen Sänger of Germany thinks "photon propulsion" — a jet of light rays projected to fantastic energies by thermonuclear power — might accomplish this end, but this is still in the realm of fantasy.

Sänger's photon rocket is theoretically possible if a method to control thermonuclear fusion can be developed, but I have to admit that envisioning a rocket with a speed approaching that of light is beyond my scope.† Even if you can establish the technology, the journey to various nearby stars beyond Alpha Centauri would take five to thirty years. From a human point of view it seems silly for a person to spend his brief life sealed in a capsule to get to a star. I have heard of the suggestion of freezing human beings for these long trips, but if you'll pardon the obvious pun this is a pretty cold existence. I think you would miss

* In September 1964 the LIL Committee organized a round-table discussion panel at Warsaw during the Tenth International Astronautics Congress. Here it was estimated that the manned laboratory on the moon could begin work between 1975-1985. The five-year period after 1970 would involve a period of exploration. In the meantime studies are going on to develop details of the laboratory.

† It is interesting to note that photon propulsion is now regarded as less efficient than other methods that could be developed for the same purpose and the idea has been abandoned by virtually all serious investigators.

the joy of a lot of sidewalk cafés while you're waiting to be thawed out.

I have also heard it said that a logical consequence of the Einstein Theory of Relativity leads one to believe that if a man could reach a velocity approaching light he would grow old much more slowly so he would still be a young man when he arrived at a star. I think this is a physical error. The process of growing old is not merely mathematical. At the risk of argument with my physicist friends I cannot help but believe that it does not depend on time alone, but also on events.

Despite the present emphasis on space, as long as the earth is surrounded by air and we have to breathe it to live, airplanes will not disappear. But many problems that now face aviation, both civil and military, will become magnified. The requirement for an enormous amount of airport space, combined with the increasing noise nuisance, drives airports farther and farther from populated places. For cities near the sea one may think of landing fields on water and the use of amphibious planes (Glenn Martin, in fact, predicts the renaissance of seaplanes).

In military aviation speed is even a greater problem and calls for a radical change of the takeoff and landing process. For example, tactical air warfare which depends on speed and flexibility of operation should be independent of runways as far as possible. To accomplish this, it may be necessary to develop new methods of reducing takeoff and landing requirements. The use of carriages, catapults, or rocket assistance represents one possible class of solutions. Another class of solutions is represented by various systems of vertical takeoff and landing (VTOL).

In the future, flight at extreme altitudes will become very common. I believe we are at the beginning of an era where ramjets, rockets, and hybrids will be developed to a degree that we find difficult today to estimate. Planes may be expected to take off, fly through the air, gaining speed and altitude, go into orbit around the earth with power shut off, reenter the atmosphere and choose a place of landing like that of a conventional plane. That is my portrait of the airplane of the future — the airplane satellite.

Of course, none of these developments will take place unless there is a hospitable world to receive them. In this area, if I may be permitted to leave science for a moment, I foresee the eventual development of an international government along the lines set forth by my father. My father wrote a paper on historical cycles in 1908, in which he traced the evolution in Europe of social organization from the family and tribe through the system of medieval guilds to the nation. He pointed out

GERMAN UNDERGROUND FACTORIES
AND REFINERIES DURING WORLD WAR II

by

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A-386SUMMARY

To a degree never before imagined, the Second World War demonstrated that with a powerful air force it was possible to decisively defeat an enemy by the total destruction of its most important industries and production installations. This new vulnerability necessitated a revolutionary method to protect key industry in modern warfare—an experience which may point the way for the future of every civilized state. The key to this protection was to change from the horizontal dispersal of significant industries, the prevalent philosophy at the beginning of the war, to vertical dispersal, or the construction of sheltered and underground plants. More than any other country, Germany planned for and utilized an extensive network of underground installations. The following pages contain every known reference to the plants and installations.

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ONTARIO
Saucer Seeker

For the past two months, what went on in the white wooden shack at the Department of Transport's Ionospheric Measurement Station at Shirley Bay, Ont. was a guarded secret. Last week, for the first time, newsmen got a look inside. "Project Magnet", they learned, was a complicated jumble of electronic gear and an enthusiastic handful of scientists engaged in a part-time effort to track down "flying saucers."

Designed by Department of Transport Engineer Wilbert B. Smith, 43, Project Magnet's saucer-sighting station is set up to make an automatic record of any object that passes overhead. Perched solidly on a concrete pillar, a gravimeter stands by to record any change in the gravitational pull of the earth below. If there are such things as flying saucers, Smith believes, they must contain a magnetic "sink", capable of extracting energy from the earth's magnetic field in order to keep themselves aloft. The gravimeter, he thinks, could help him detect a nearby saucer.

Flying crockery became Smith's hobby four years ago when the growing list of reported saucer sightings in the U.S. and Canada convinced him that strange objects really were whizzing through the air. After two years of speculation he got the Department of Transport's permission to do some official saucer searching. With the help of other saucer seekers, and left-over equipment from the departmental workshops, he put Project Magnet together in his spare time.

The project has yet to record anything but normal air traffic. But Smith is not at all disappointed. He himself saw a saucer just a year ago. ("It was a silver disk in the sky, going like hell.") Reports still stream in from amateur sighters elsewhere. "We are hopeful that we can pick up (a saucer) with our apparatus within a year or so", says Smith.

- (1) RECORDS
(2) FOR FILE

22-12-33 (TRB)

TRB

September 15, 19

PROJECT 'MAGNET'

Dr. P. M. Millman, National Research Council, has advised me that the documents reporting the results of the second story studies in project 'Magnet' be declassified. Those reading this file will see that project 'Magnet' is a part of this file.

2. Since the question of flying saucers is still attracting public attention and since this file covers documents relating to the studies behind project 'Magnet' and, indeed, records much of the discussion in the Department of Transport surrounding project 'Magnet' which is confidential in nature, it is recommended that this file be down classified at least to the confidential level. At no time should it be made available to the public.

3. Those wishing to obtain a copy of project 'Magnet' can do so provided they represent an organization, describe the purposes of the organization and set forth the basis of their need for a copy to Dr. Millman of National Research Council. They may see the project 'Magnet' report upon making an appointment at the Meteor Centre, phone 3-9318.

4. A copy of the project 'Magnet' report on this file is the original and should not be destroyed until such time as this subject has "cooled off".

ORIGINAL SIGNED BY
W. J. WILSON

W. J. Wilson

MEMORANDUM

CLASSIFICATION

TO
A

- (1) RECORDS
- (2) FOR FILE

YOUR FILE No.
Votre dossier

OUR FILE No. 22-12-33 (TRB)
Notre dossier 22-12-39

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TRB

DATE September 15, 1969.

SUBJECT
Sujet

PROJECT 'MAGNET'

Dr. P. H. Millman, National Research Council, has advised me that the documents reporting the results of the Second Story studies in project 'Magnet' be declassified. Those reading this file will see that project 'Magnet' is a part of this file.

*DRB
Agreed
to this
WJH*

2. Since the question of flying saucers is still attracting public attention and since this file covers documents relating to the studies behind project 'Magnet' and, indeed, records much of the discussion in the Department of Transport surrounding project 'Magnet' which is confidential in nature, it is recommended that this file be down classified at least to the confidential level. At no time should it be made available to the public.

3. Those wishing to obtain a copy of project 'Magnet' can do so provided they represent an organization, describe the purposes of the organization and set forth the basis of their need for a copy to Dr. Millman of National Research Council. They may see the project 'Magnet' report upon making an appointment at the Meteor Centre, phone 3-9318.

4. A copy of the project 'Magnet' report on this file is the original and should not be destroyed until such time as this subject has "cooled off".

W. J. Wilson
W. J. Wilson

6/10/69

*BTR
memo for a copy of this
to the cover of the Report.
Also a copy made for
22-12-39 (Project Second Story)
C. Millman
6/10/69*

~~SECRET~~

IN REPLY PLEASE QUOTE

RM/12/2

SECRET

CANADIAN JOINT STAFF

OFFICE OF DEFENCE RESEARCH MEMBER
1746 MASSACHUSETTS AVE., N.W.
WASHINGTON, D.C.

28 October 1952

Chairman
Defence Research Board,
Ottawa, Canada

Attn: Aero Section

Unidentified Flying Objects
Project Grudge

Released to
Nov. 3, 1952
DR BS 200-4-16
1714

1. A USAF analysis of the first 244 reported incidents is summarized below.
2. Since 5 December 1948 a series of recurring phenomena described as "green fireballs" have been reported in the general vicinity of Albuquerque, New Mexico. Dr. Lincoln La Paz, noted meteoritic expert has been directly, though unofficially, associated with the investigation of these sightings and has himself observed the phenomena. Dr. La Paz states he is convinced the green fireballs are not ordinary meteors. This group of incidents has little or nothing in common with other incidents on file with Project Grudge, therefore, these incidents are not considered in the analysis. The Scientific Advisory Committee was asked to investigate the matter and had advised that an independent investigation be conducted in the field of atmospheric research.
3. Upon eliminating several additional incidents due to vagueness and duplication, there remain 228 incidents. Thirty of these could not be explained because there was found to be insufficient evidence on which to base a conclusion.
4. Consulting agencies provided plausible solutions for 164 incidents with the following comments and findings:
 - (a) Rand Corp. - (172 incidents considered). "We have found nothing which would seriously controvert simple rational explanations of the various phenomena in terms of balloons, optical illusions, conventional aircraft, planets, meteors, bits of paper, practical jokers, psychopathological reporters, and the like."
 - (b) Ohio State University (Dr. Hynck - 244 incidents considered). Assuming evidences of observers and investigators to be correct, Dr. Hynck concluded that 32% could be explained astronomically, 35% could be attributed to balloons, aircraft, rockets, birds, etc., and 33% either lacked necessary evidence or a suitable explanation was not apparent. When due allowance was made for inaccuracies in observing and reporting, 53% might be explained astronomically.

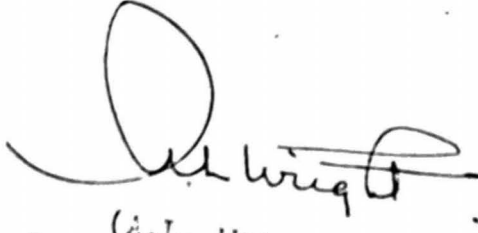
Classification cancelled / Changed to _____
 By authority of _____
 Date _____
 Signature _____
 Unit _____

~~SECRET~~

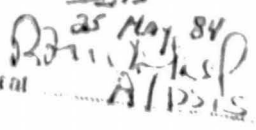
alt
6/21/67

- (c) Air Weather Service - (233 incidents considered). 12% apparently were weather balloons.
- (d) Air Materiel Command Aeromedical Laboratory (Dr. Paul M. Fitts - 212 incidents considered. There are sufficient psychological explanations for the reports of unidentified flying objects not otherwise plausible explanations for reports not otherwise explainable. These errors in identifying real stimuli result chiefly from inability to estimate speed, distance and size.

5. Of the remaining 34 incidents, investigation shows that they form no pattern in regard to area of sighting, type of object, or manner of performance. There are indications, however, that some sightings were influenced by earlier reports, and probably would not have been considered unusual or reported had there been no publicity.


 (A.L. Wright)
 Defence Research Member

cc: Chairman, CJS
 Air Member, CJS

File of the ... call, 4/1/67 ...
 Date: 25 May 84
 Signature: 
 Unit / Rank / Appointment: A/PSIS

~~SECRET~~

Alc
is
sly

CONFIDENTIAL

MEMORANDUM

DRBS 200/4/160
ANSWER

To: DST (Mr Standard)

To:

To note a PA on your file or
letting us you wish as another
copy has gone to the DUE for
the NDA file on this proposal.

W.D. Humphrey
(initials)

58/52

2/5/65
Miscell.
P.A. on Flying
Saucer file.
ES.

Classification cancelled / Changed to Unclass
By authority of 12515
Date 25 May 64
Signature R. J. [illegible]
Unit / Rank / Appointment 1710 515

THE DEPARTMENT OF EXTERNAL AFFAIRS

OTTAWA, August 1, 1952

D/E National Defence
Chief of Air Staff
To: Chairman, Defence Research Board
~~D/M Trade & Commerce (attn. R. R. Hayden, Esq.)~~

The documents described below are attached for your information or for any action you consider necessary:

Letter No. D-497 of August 1 to Bonn.

Also referred to:

As above.

Defence Liaison 1/JG .Halstead/cln

Classification cancelled / Changed to Unclass
By authority of DSB
Date 23 May 84
Signature R. R. Hayden
Unit / Rank / Appointment A / DSIS

Escott Reid
Acting Under-Secretary of State
for External Affairs

Ex. 192 C

DUPLICATE

OTTAWA FILE
40B-AE-40
No.

D-40
Letter No.
Date August 1, 1952

SECURITY CLASSIFICATION
~~CONFIDENTIAL~~

FROM The Canadian Embassy, Bonn.

TO THE UNDER-SECRETARY OF STATE FOR EXTERNAL AFFAIRS, CANADA
Reference Your despatch No. 371 of April 29 and your letter No. 470
of June 4.
Subject: Aircraft Development; Offer of services of
Rudolph von Weerscheidt-Millessem

We have now heard from the Department of National Defence with reference to the communication from Mr. von Weerscheidt-Millessem which has been passed to them for their comments.

2. We are advised that it is an established policy in the Department of National Defence not to authorize the expenditure of any monies in the development of a new weapon until the technical experts of that Department have been given the opportunity of studying its possibilities. An objective appraisal of a proposed new weapons cannot be made unless a complete description, accompanied by drawings or photographs, is submitted. Mr. von Weerscheidt-Millessem has so far given only a very general description of his alleged "flying saucer" invention, which is far from sufficient to allow proper appraisal. Moreover, the Department of National Defence has been unable to find any record of his having the qualifications to which he has referred.

3. In view of this, it is suggested that you inform Mr. von Weerscheidt-Millessem that, unless he produces some actual data for his invention, no consideration whatsoever can be given to his proposals. If he submits the requested data, I should be grateful if you would seek additional information regarding his background, keeping in mind, of course, his request that the matter be handled in strict confidence.

Classification cancelled / Changed to Unclass
By authority of 2412
Date 25 May 54
Signature R. H. H. H.
Unit / Rank / Appointment HTP 215

Noted
1/5/52

OSA Kitchener

(10) Acting Under-Secretary of State
for External Affairs

Copies Referred To
No. of Enclosures
Post File No. 25-40

ROYAL CANADIAN AIR FORCE

Ontario,
18 August, 1952.

Mr. A.H. Monas,
P.O. Box 334,
Whitehorse, Yukon.

Dear Mr. Monas:

This is to acknowledge receipt of your letter of 30 July, 1952 and the enclosed clipping and translation. Your interest in this matter is greatly appreciated and the information has been passed to the appropriate branch of the Royal Canadian Air Force.

Yours truly,



(G.W. Kusiar)
Wing Commander
for Chief of the Air Staff.


ELH/WH

Copy of an article which appeared in the "Duesseldorfer Nachrichten" on June 7th, 1952, printed in Duesseldorf, Germany.

Free translation of the article.

FLYING SAUCERS GERMAN V7?

PARIS. The flying saucers seen on various occasions could be flying apparatus guided from afar and be of German design similar to the V arms, declares on Friday the Paris Evening Paper "France Soir". The paper bases in this important article its statement on a report of a German V Waffen Engineer, Dr. Richard Miethe, at present living in Tel Aviv, who is supposed to have said: "I dare to state that flying saucers, which appear in the sky, were constructed in Germany according to my own specifications and most probably are now built in series by the Russians." The German Engineer is supposed to have said that a new design of the V arms in the shape of discs capable of traveling 21,000 kilometers and equipped with radar and called V 7 was ready for mass-production at the end of the (last) war. These guided discs were successfully used over the Baltic Sea.

GERMAN language. Translated by I.T. at R.C.M.P. Headquarters

Translation of Letter #332

Rudolf Goy,
MENEHEK Power,
P.O. Box 2000,
Mont Joli, P.Q.

Please don't put it away!

16-9-52

RECEIVED
5/2630
OCT 6 1952

Air Vice Commander,
Royal Canadian Air Force,
Ottawa, Ontario.

W. L. ...

Classification cancelled / Changed to _____
By authority of *DS/34*
Date *25/3/54*
Signature *B. ...*
Rank *...*

Gentlemen,

I am sorry if I send something to tell you about the "Flying Saucers".

I am a German and my trade is AERONAUTICAL ENGINEER. Please don't think I look for a job in this trade. No, I just want to tell you, what happened about this plane before all is over.

I am sorry if I Write in the German language below, my English grammar is too bad to tell you right. (The above part is written in the English language by Rudolf Goy. - The rest is in German. - Tr.)

I wish to emphasize once more that by writing this letter I do not seek employment or intend to make a name for myself in such an easy way. I wish to make this clear from the outset.

I think after all this tom-tom about these flying apparatuses it is time to say something about them and I therefor come to you. The noisy publicity accorded these objects must be known to you, and I want only to warn you about believing that these objects are emitted by the stars or that they are weather phenomena; if you did you would be on an entirely wrong track.

In 1944 I and a group of scientists and technicians worked on a flying vessel that resembled the "flying saucers". In order to be safe from aerial attacks and to be able to work undisturbed our group was transferred to Silesia. Our experiments were made with models, but they had to be conducted with the utmost haste, because this was "Hitler's secret weapon" according to the instructions of REICHS-MARSHAL GOMBERG. We were under his direct command and our work separated us from the outside world. Even the letters to my wife had to be mailed to Berlin where they were censored.

In 1945 all was over. We decided to separate and reach the West in order to save at least something. Not all were successful. I learned later that the heads of our group, probably some results of experiments, also drawings, were taken. A colleague of mine who escaped at the last moment reported this to me.

Who? Friends?

And now - the apparatus itself;

After "WINDKANAL" (wind channel) there was built an experimental model of 3,6 meters wing span. The driving force for the experiments were rockets. Steering drive - remote control -, guiding was similar to the FX - bombs, which undoubtedly are known to you; also release-steering ("RELEISSFEUER" in the original. - Tr.)

~~CONFIDENTIAL~~

The results were astounding and exceeded all our expectations as far as flight and technique are concerned. It would take too long to describe everything in detail. You are assisted by a staff of scientists, and I can only suggest that you keep on working at this in order to avoid a situation where you think you are in the forefront of science only to find out that a certain country ("ERDENTEIL" - continent in the original - Tr.) is 10 years ahead. I am thinking of the jet pilots in Korea.

Please, do not think that I, an insignificant person, want to tell you what to do, - no - I only want to beg you not to be swayed by differing opinions about things which actually exist.

Some may perhaps say that this German wants us Canadians etc. But, please, gentlemen, the question is not: who has invented this thing first; what matters is - not to be the last and not to be confronted with accomplished facts in case of a decision.

I hope you understand me. Although it is not my duty to talk about it, but I think the fact that these things exist absolves me of any obligations of secrecy to the builder,, made at that time.

With friendly greetings and good wishes for success in your work,

Your

Rudolf GOY

P.S. I am taking the liberty of informing also the "Air-vice Commander" of the U.S.A. Air Force.

Classification cancelled / Changed to Unclass
 By authority of DSIS
 Date 23/3/84
 Signature R. Goy
 Unit / Rank / Appointment N. DSIS

DEFENCE RESEARCH BOARD
MEMORANDUM

10 Oct 52

DAI
Room 2621
"A" Building

FLYING SAUCERS

Classification cancelled / Changed to Unclass
By authority of DSIS
Date 25/5/84
Signature [Signature]
Unit / Rank / Appointment ADDSIS

1 Reference is made to the translation of letter #332 written by Rudolph Goy, 16 Sep 52.

2 The officers of this Directorate are not aware of any project of this nature that was in progress in Silesia during the latter part of World War II. It would be appreciated, therefore, if Mr. Goy could be interrogated with a view to obtaining information as follows:

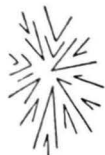
- (a) Personnel working on the "Flying Vessel" Project during 1944 - 45
 - (i) Names of personnel
 - (ii) Designation of each person within the group
 - (iii) Classification of each person, i.e. scientist, technician etc.
- (b) Location of Group
 - (i) Dates of move to Silesia
 - (ii) Location before move to Silesia
 - (iii) Location of group in Silesia
 - (iv) Heads of the group taken by whom. (Russians?)
- (c) Details of "Flying Vessel"
 - (i) General configuration with sketch
 - (ii) Principles of operation
 - (iii) Wing planform and section
 - (iv) Method of control including significance of "Release steering"
 - (v) Description of results of tests.
- (d) Evaluation of Source
 - (i) Personal evaluation by interrogation team.
 - (ii) Whether source was interrogated before entry into Canada and if so, by whom.
 - (iii) Whether source volunteered this information to anyone before writing to the RCAF.
 - (iv) Background of source including University degrees taken, dates and places attended, post graduate work.

[Signature]
(W.D. Birch)

for Director of Scientific Intelligence

The Strategy of Prevention (1939-1942)

Six



That summer the news which reached the United States about the progress made by the German uranium project became more and more alarming. In Berlin there had been a second meeting of nuclear physicists. This time it had been called by the head of the Research Division of the Army Weapons Department. Colonel Schumann had acted on the basis of information from the Hamburg physicist Harteck. This researcher had drawn attention at the end of April to the "possibility, in principle, of the release of a chain reaction in uranium." According to a later report by his associate, Diebner, he had recommended its investigation by the German War Office.

A further item of news which reached the physicists in America by secret channels seemed to indicate that the Germans were really in earnest. They had suddenly forbidden all exports of uranium ore from Czechoslovakia, which they had recently occupied.

The only other place in Europe with any large stocks of uranium was Belgium, which obtained it from the Belgian Congo. Should not something be done at once, thought Szilard, to safeguard from seizure by Hitler this metal which had now become strategically so important? The American State Department did not yet realize that uranium might have any military significance at all—this rare metal had been used almost entirely for the production of luminous figures on dials and for the manufacture of pottery.

(1939-1942)

It was then that it occurred to Szilard for the first time that Einstein might help. Einstein belonged to the small international group of friends, outstanding intellectually and musically, which the Belgian Queen Mother, Elisabeth, had gathered around her in the course of her life. It might perhaps be possible to convey a warning to the Brussels government through this connection. An appointment was soon made with the father of the theory of relativity, who lived at Princeton, where Szilard's close associate Wigner also lived. Einstein was about to leave for his summer holiday on Long Island, but he had no objection to his two colleagues paying him a visit there to discuss their important project.

Accordingly, Wigner and Szilard, one hot day in July 1939, set off for Patchogue on the south coast of Long Island. After a drive of two hours, they discovered that apparently they had been given the wrong address.

"Perhaps I misunderstood the name Patchogue on the telephone," Wigner said. "Let's see if we can find some similar name on the map."

"Could it be Peconic?" asked Szilard after some minutes of strained silence.

"Yes, that was it," Wigner answered. "Now I remember!"

At Peconic the two travelers made exhaustive inquiries as to the whereabouts of the cabin of a Dr. Moore, whose small house Einstein had rented. A group of vacationers in shorts and brightly colored bathing suits came sauntering along. "No, we don't know Dr. Moore's cabin," they answered. Nor did the local inhabitants seem to have any information on the subject.

The two men continued to drive around, though it seemed a hopeless venture. Suddenly Szilard exclaimed: "Let's give it up and go home. Perhaps fate never intended it. We should probably be making a frightful mistake by enlisting Einstein's help in applying to any public authorities in a matter like this. Once a government gets hold of something it never lets go. . . ."

"But it's our duty to take this step," Wigner objected. "It must be our contribution to the prevention of a terrible calamity." So the pair continued their search.

The Strategy of Prevention

"How would it be," Szilard proposed eventually, "if we simply asked where around here Einstein lives? After all, every child knows him."

The idea was immediately put to a practical test. A sun-burned little boy about seven years old was standing on a street corner absorbed in adjusting his fishing rod.

"Do you know where Einstein lives?" Szilard asked him, more by way of a joke than in earnest.

"Of course I do," retorted the youngster. "I can take you there if you like."

The visitors had to wait for a short time on the open veranda before Einstein came out, wearing slippers, and escorted them to his study. Szilard's account of this first important conversation runs as follows:

The possibility of a chain reaction in uranium had not occurred to Einstein. But almost as soon as I began to tell him about it he realized what the consequences might be and immediately signified his readiness to help us and if necessary "stick his neck out," as the saying goes. But it seemed desirable, before approaching the Belgian government, to inform the State Department at Washington of the step contemplated. Wigner proposed that we should draft a letter to the Belgian government and send a copy of the draft to the State Department, giving it a time limit of a fortnight in which to enter a protest if it believed that Einstein should abstain from any such communication. Such was the position when Wigner and I left Einstein's place on Long Island.

Szilard was now again confronted by the same obstacle which had been occupying his mind for weeks. How could he make sure of the attention of the American government? He discussed the problem with a number of friends, including Gustav Stolper, the German economist and former editor of the periodical *Der deutsche Volkswirt* (*German Economist*), who had emigrated to New York. Stolper had an idea. He was acquainted with a man who was known, though he was not himself a government official, to have the ear of President Roosevelt. This was the banker and scholar Alexander Sachs. This international finan-

(1939-1942)

cial could always obtain entry to the White House, for he had often amazed Roosevelt by his usually astonishingly accurate forecasts of economic events. Ever since 1933 Sachs had been one of the unofficial but extremely influential advisers of the American President, all of whom had to possess, by F.D.R.'s own definition, "great ability, physical vitality and a real passion for anonymity."

Sachs at once supported Szilard's ideas enthusiastically. During the next two weeks the two men drafted, in Sachs's office in the Wall Street investment firm of Lehman Brothers, a letter which went further in its terms than the document Einstein had originally been willing to sign. It was now intended that the draft should go not, as formerly planned, to the State Department, but to the White House. More rapid and energetic action was to be expected from the President than from the Secretary of State. The draft dealt with the point discussed with Einstein—the need for American negotiations with the Belgian government on the subject of the safeguarding of the stocks of uranium from the Congo. But in particular, a second point now added was a proposal for the financial support and acceleration of atomic research. The authors of the letter deliberately refrained from asking for any government assistance, but merely suggested that a confidential agent of the White House should be appointed to obtain the co-operation of private individuals and industrial laboratories in the secret project envisaged.

On August 2 Szilard again drove out to Long Island. Wigner had by that time gone to California, so Szilard's driver was his young countryman Edward Teller, later to play a further important part in the fateful drama lived by the atomic scientists. Did Szilard already have the final text of the draft in his pocket that day? Both Teller and Einstein state that he had. Einstein always declared that he merely signed this document. Szilard, on the other hand, observes: "So far as I remember, Einstein dictated a letter to Teller in German and I used the text of that letter as a basis for two more drafts, one comparatively short and one rather longer, both addressed to the President. I left it to Einstein to decide which he preferred. He chose the longer

draft. I also prepared a memorandum as an enclosure to Einstein's letter. Both letter and memorandum were handed to the President by Dr. Sachs in October 1939."

This version of what took place seems the more probable to Dr. Otto Nathan, who had known Einstein for many years and later acted as his executor. Teller, however, affirms positively: "Einstein only signed his name. I believe that at that time he had no very clear idea of what we were doing in nuclear physics." Sachs, too, states, not without a certain degree of cynicism: "We really only needed Einstein in order to provide Szilard with a halo, as he was then almost unknown in the United States. His entire role was really limited to that."

"I really only acted as a mail box. They brought me a finished letter and I simply signed it." Such was the apology offered by Einstein after the Second World War to Antonina Vallentin, his old friend and biographer. He very soon began to regret his action. This gifted man of learning and great friend of peace explains further, clearly, in personal letters and notes which will probably be made public in future years how through a paradox of fate he had decided to give the starting signal for the most horrible of all weapons of destruction.

Einstein was of course at that time convinced that the government, which he had recommended take an active interest in the uranium problem in order to guard against possible surprise by a German atom bomb, would handle the tremendous new power entrusted to it with true wisdom and humanity. He acted on the assumption that the United States would never use such a bomb for any object other than self-defense against a similar weapon and even then only if its own safety were imperiled to an extreme degree. But when six years later the first atom bomb was employed against Japan, a country already on the verge of capitulation, he felt that both he himself and the atomic scientists who had worked on the construction of the weapon had been deceived.

The tragedy of the decision taken by the pacific-minded Einstein deepens when one realizes, as is possible today, that

the menace of a German uranium bomb, doubtless believed perfectly genuine by the eminent scholar and those who influenced him, was in fact nothing more than a terrible phantom.

Einstein said, with deep regret, after the war: "If I had known that the Germans would not succeed in constructing the atom bomb, I would never have lifted a finger." The ability of the Third Reich to produce new weapons capable of deciding the issues of war was then greatly overestimated throughout the world. Subsequent investigations by Allied committees proved that on the outbreak of war the German leaders erroneously believed that they could achieve final victory with the weapons they already had. It was not until 1942 that the development of new weapons attracted any attention in the Reich. The advantage held by the Allied Nations was by that time already so great that there was no longer any hope of reversing it. The most important new weapon developed by the Germans during the war, the V2 long-range rocket, came into use at a stage of the conflict when Germany's position had become quite desperate.

The indifference of Hitler and those about him to research in natural science amounted to positive hostility.* It had at a very early period cost the Führer the good will of physicists. Only a handful of them, out of ambition or because they had failed to make their mark prior to the advent of the Third Reich, offered Hitler their full co-operation.† The great majority, however,

* The only exception to the lack of interest shown by authority was constituted by the Air Ministry. The Air Force research workers were in a peculiar position. They produced interesting new types of aircraft such as the Delta (triangular) and "flying discs." The first of these "flying saucers," as they were later called—circular in shape, with a diameter of some 45 yards—were built by the specialists Schriever, Habermohl and Mieth. They were first airborne on February 14, 1945, over Prague and reached in three minutes a height of nearly eight miles. They had a flying speed of 1250 m.p.h. which was doubled in subsequent tests. It is believed that after the war Habermohl fell into the hands of the Russians. Mieth developed at a later date similar "flying saucers" at A. V. Roe and Company for the United States.

† These were mainly engineers. Those engaged on theoretical research only co-operated in exceptional cases. It is true that the Allied Nations technicians, after the occupation of Germany, found thousands of new

The Strategy of Prevention

were soon whispering to one another the inversion of a current Nazi slogan: "War must be harnessed to the service of science." Hitler's attempt to raise Germany to the status of a global power had been too lightly undertaken to succeed. Such was the view of men who never expected an experiment to come to anything unless its foundations had been well and truly laid. It consequently became important to save from the imminent disasters ahead as much as possible of German research that had not yet been utterly ruined by the regime. After the war had been lost science would probably be one of the few items still standing to the credit of Germany on her balance sheet.

Four factors combined to frustrate the construction of a German atom bomb. In the first place the absence of the eminent physicists driven into exile by Hitler proved a severe handicap. Second, the poor organization by the Nazis of research in the interests of war and its inadequate recognition by their government. Third, the insufficiencies of the technical equipment at hand for so complex a project. Finally (and too often overlooked so far), the actual personal attitudes of the German experts in atomic research counted against success. In the face of incomprehension by the authorities, they did nothing to overcome this obstacle. They did not push for the construction of such a bomb (in clear contrast to the German rocketeers, who finally conquered Hitler's indifference to "guided missiles" and got "their" V2 weapons). On the contrary, these physicists were able successfully to divert the minds of the National Socialist Service Departments from the idea of so inhuman a weapon.

Very little about this personal attitude has hitherto been revealed to the public. Most of those concerned have themselves preferred, for the sake of discretion and tact, to restrict mention of this delicate affair to a somewhat narrow circle. They content themselves with emphasizing, when called upon to explain why no German atom bomb existed at the end of the war, the lack of interest among their political leaders and the techni-

military inventions there. But these always concerned the practical application and technical improvement of scientific principles already well known.

(1939-1942)

cal difficulties which in fact became almost insuperable from the end of the year 1942 with the start of heavy Allied air attack. Heisenberg, who was in charge of the German uranium project, stated at the end of 1946, in the periodical *Naturwissenschaften*, that "external circumstances" had relieved the German experts in atomic research from the need "to take the difficult decision whether or not to produce atom bombs." This is a fair statement, but it is really only valid from the summer of 1942 on. But what happened before then? What did Heisenberg mean when he wrote in the same article: "German physicists worked consciously from the beginning to retain control of the project in view. They used their influence as experts on the subject to direct studies of it in the sense described in the present report."

At first the German "U Project," as it was called by the authorities, made more rapid progress, in the purely administrative sense, than similar efforts in the Allied countries and the still-neutral United States. Although most of the physicists were called up for military service immediately after war had broken out, three or four weeks later the more important of them were returned to their institutes as "indispensable." As early as September 26, 1939, more than a fortnight before Alexander Sachs could obtain an interview with Roosevelt and show him Einstein's letter, nine nuclear physicists—Bagge, Basche, Bothe, Diebner, Flüge, Geiger, Harteck, Hoffmann and Mattauch—attended a meeting at the Heereswaffenamt (the Army Weapons Department) in Berlin. At this conference a detailed program of work was drawn up and, as Diebner recalls, "separate tasks were assigned to various study groups." Such was the true origin of the so-called "Uranium Verein" ("Uranium Society"). Four weeks later a larger group met, by that time including Heisenberg and Weizsäcker. One of the first questions to be decided was the degree of refinement of the uranium oxide required for experimental purposes. The specialist appointed to carry out the chemical tests at Göttingen was, however, on military service. Some time passed before he could again be made available. Then it turned out that nearly all the uranium

The Strategy of Prevention

oxide in Germany had already been bought up by another Army department, which refused to return it under any circumstances. The department, in fact, was hoping to be able to produce armor-piercing shells by the use of this heavy metal as an alloy.

The first practical experiments, carried out at Leipzig, failed. The physicist Döpel, in ignorance of the chemical properties of uranium, had applied a metal shovel to it and thereby caused spontaneous combustion. When he poured water on the flames they spread faster than ever. A fountain of glowing uranium shot up, twenty feet high, setting the ceiling of the laboratory on fire. The Leipzig Fire Brigade turned out in full strength, and as a result only a few people were slightly burned. Döpel uttered a prophecy which at the time sounded merely melodramatic: "Hundreds more will fall for the supreme goal—the atom bomb."

In the autumn of 1939 the Kaiser Wilhelm Institute for Physics was made the scientific center of the Uranium Society. Peter Debye, the director of the Institute, was a Dutchman who had been working unmolested in Germany ever since 1909. He was now required either to become a German citizen or at least to publish a book in favor of National Socialism to prove his reliability. He rejected these insolent demands with contempt and took advantage of an invitation to give some lectures in the United States to turn his back for ever on his second home. Shortly afterwards Heisenberg succeeded him in charge of the Institute, a post he held for the duration of the war. This decision on Heisenberg's part was much criticized by his physicist friends abroad. It seemed to them a startling confirmation of the suspicion they had entertained for some time that Heisenberg had made his peace with Hitler.* Even in Germany itself

* Von Weizsäcker remarks in this connection: "After Debye's departure we came under the control of the Army Weapons Department. We had more and more extremely uncongenial people planted on us as time went on . . . we summoned Heisenberg to the Institute every week to advise us. After the lapse of a year he became, as we had foreseen, in practice the director of all our studies. We then succeeded in persuading the President and Senate of the Kaiser Wilhelm Society, who knew per-

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Heisenberg's conduct was bitterly resented by certain physicists. They believed then and still believe today that if he had kept unequivocally clear of National Socialism he would not only have encouraged all those scientists of ability who were opposed to Hitler but might also have inspired them, as a leading spirit, to undertake active resistance.*

Heisenberg's friend and colleague Weizsäcker seeks to excuse him on the ground that he had always been a man of cosmopolitan training and outlook who nevertheless loved his native land. He is alleged to have remained in Germany in order to contribute to the survival of German physics under the calamities he foresaw.

But there was a further motive involved, perhaps the most important of all. Heisenberg only hints at it in his 1946 article. He and his closest friends wished, by controlling the Kaiser Wilhelm Institute for Physics, to keep the development of German atomic research in their hands. For they still feared at that time that other less scrupulous physicists might in different circumstances make the attempt to construct atom bombs for Hitler. It was considered certain not only in New York but also in Dahlem that the possession of such a weapon by a fanatical

fectly well what our political opinions were, to appoint Heisenberg our official director. This put an end to the nuisance of intruders from outside. In order to avoid encroaching upon Debye's prerogative, Heisenberg was given the title of 'Director at the Institute.' For we continued to consider Debye Director of the Institute."

* Heisenberg's own defense of his behavior at that time was expressed to the author as follows: "Under a dictatorship active resistance can only be practiced by those who pretend to collaborate with the regime. Anyone speaking out openly against the system thereby indubitably deprives himself of any chance of active resistance. For if he only utters his criticism from time to time in a politically harmless way, his political influence can easily be blocked. . . . If, on the other hand, he really tries to start a political movement, among students for instance, he will naturally finish up a few days later in a concentration camp. Even if he is put to death his martyrdom will in practice never be known, since it will be forbidden to mention his name. . . . I have always . . . been very much ashamed when I think of the people, some of them friends of my own, who sacrificed their lives on July 20 and thereby put up a really serious resistance to the regime. But even their example shows that effective resistance can only come from those who pretend to collaborate."

dictator who would stop at nothing would bring unimaginable misery upon the world.

By the winter of 1939-40 Heisenberg had already completed theoretical studies laying down the difference in principle between a uranium pile, in which the chain reaction is controlled, and a uranium bomb, in which the avalanche of neutrons is allowed to accelerate to the point of explosion. On July 17, 1940, Weizsäcker committed certain ideas to paper, under the heading "A possible method for the production of power from U 238." They showed that an entirely new substance, which could be used "as an explosive," might arise in a uranium pile. But he did not at that time call this substance plutonium, as did his colleagues in the Anglo-Saxon countries. He simply called it "Element 93," though he still retained a doubt whether it ought not really to be "Element 94."

Such ideas did not, however, go beyond the most intimate circle of Heisenberg's collaborators; they prudently refrained from passing on their preparatory theoretical studies on this theme. They were determined not to attract the attention of even their closest associates to the possibility of an atom bomb. Whenever suggestions pointing in that direction did nevertheless occasionally emanate from other physicists, they were not indeed rejected by Heisenberg as impossible in principle, but merely labeled unrealistic: "At present we can see no practicable technical method of producing an atom bomb during the war with the resources available in Germany. But the subject, nevertheless, must be thoroughly investigated in order to make sure that the Americans will not be able to develop atom bombs either." Such was the reason given, by this extremely influential group within the Uranium Society, for their merely expectant attitude. On the other hand, it was still considered necessary for the uranium project to retain, in the eyes of the government, enough of its highly promising character to justify the release of young physicists from military service. So this somewhat dangerous game, a source of mistrust and misunderstanding, continued, with its alternate postponements and promises.

In addition to Heisenberg and Weizsäcker, a third physicist, working in Germany during the years 1940 and 1941, had discovered that a uranium bomb could probably be manufactured very soon after a previous production in a uranium pile of a new explosive element. It was the man who had participated in the discovery of thermonuclear processes in the sun, Fritz Houtermans.

On Hitler's accession to power he had emigrated and thereafter been caught in the vortex of espionage psychosis that affected Soviet Russia in 1937. But he had been clever enough to postpone his "liquidation" by the Russian secret police through an adroit move on the chessboard of intrigue. He soon found that his examiners were not convinced by his protestations of innocence. In fact, they took no account of them whatever and simply went on torturing him. On one occasion he was beaten up for seventy-two hours on end, having all his teeth knocked out in the process. He accordingly contrived a trick. He told himself: "The officials in charge of the investigation are only concerned to produce their quota of such and such a number of confessions. I'll let them have what they want. But I shall insert a little time bomb in my statement. It may perhaps actually secure my release from prison." He proceeded to "confess" that he had in fact, as the secret police suspected, practiced espionage and sabotage against the Soviet Union, using for the purpose a certain small apparatus which he had himself invented in secret. Houtermans not only gave an accurate description of the instrument in question but also prepared detailed blueprints of its design. He alleged that it had enabled him to identify precisely, from the ground, the speed of Soviet aircraft, and thus to pass on important armament secrets to the Germans. The captive physicist was gambling on the chance that the plans he submitted might be laid before his former colleague Kapitza for investigation. The latter, or indeed any other expert, would then immediately perceive that Houtermans's "invention," in the form given, was perfectly senseless scientifically, and that consequently his entire confession had been untrue and must in all probability have been extorted from him by ill-treatment. In

The Strategy of Prevention

this way Houtermans not only gained a temporary respite from the attentions of his examiners but also a chance that his case might possibly be accorded fresh consideration by external authority.

In the spring of 1940 Houtermans was conditionally released. It is not known whether he owed his freedom to the petitions of well-known foreign physicists or to intervention by Kapitza. He was handed over, at Brest-Litovsk, to the Gestapo, who at first locked him up again. But eventually, on the intercession of von Laue, he was paroled subject to the proviso that he remain under observation by the Gestapo during the war and did not engage in any state or university research project. Houtermans had only been at liberty for a few days in Berlin when he learned the strictly kept secret of the existence of the Uranium Society. He instantly guessed what object the group in question probably had in mind, though owing to the years he had spent in prison he had not been able to keep in touch with the latest developments of atomic research. He himself had called attention, as early as 1932, to the possibility of a chain reaction and had worked, up to the time of his arrest in the Soviet Union, at the further elucidation of such problems. In 1937 he had actually lectured on neutron absorption to the Soviet Academy of Sciences. If the Communist secret police had not just then carried him off in the midst of his studies, it is quite possible that atomic fission and chain reaction would have been first discovered in Soviet Russia.

On hearing that Heisenberg and Weizsäcker were now seriously investigating the question of a practical application of the chain reaction Houtermans was profoundly shocked. He consulted von Laue. The Nobel prize winner consoled him with the remark: "My dear colleague, no one ever invents anything he doesn't really want to invent."

Since Houtermans was prohibited from working in any state-controlled or university laboratory, he applied, in May 1940, to the well-known inventor Baron Manfred von Ardenne, who was carrying out studies on behalf of the Post Office in his private research institute at Lichterfelde near Berlin. It is charac-

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teristic of the rivalry at that time prevailing among the various government offices of the Third Reich that in addition to the Ministry of Education and the War Office even the Post Office was engaged on atomic research. Ohnesorge, the Postmaster General, probably believed that he would rise enormously in his Führer's estimation if he of all people, though in charge of a civilian department, were to present Hitler, one day, with a "miracle weapon." But when in 1944 the long-yearned-for moment at last arrived and Ohnesorge, at a meeting of the Cabinet, started to hold forth about the present position of his studies in connection with the provision of a uranium bomb, Hitler interrupted him with the contemptuous observation: "Look here, gentlemen! You are all racking your brains to discover how we are going to win the war and, lo and behold, here comes our Postmaster, of all people, with a solution of the problem!" So far as the Führer was concerned, that settled the matter.

Houtermans did not dare to refuse point-blank the order of his new chief, von Ardenne, to apply himself to the uranium problem. Averse as he was to undertaking any sort of war work, his bitter experiences in the Soviet Union had taught him that in such cases the safest thing to do was to "play ball," to make a pretense of co-operation. He had to take care to keep memoranda composed in the course of the work locked away in secret safes.

In September 1940 Houtermans completed his first study of the uranium problem. His notes already at that time referred to the use of uranium piles to generate microscopically small quantities of Element 93 or 94. By July 1941 it was perfectly clear to him that it would be possible to produce an atom bomb provided that ponderable amounts of that substance—later called plutonium—could be generated in the uranium pile. Houtermans, however, did not report on this aspect of his work, since he did not wish to call the attention of the state authorities to the possibility of the construction of atom bombs. Moreover, he requested Dr. Otterbein, through whom the Post Office kept in touch with the Uranium Society, to see to it that for the present there should be no publication of his studies in the

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secret reports of the Army Weapons Department. By making further inquiries from time to time he was able to make sure that his notes continued to repose in a post-office safe. It was not until he learned in 1944 that the Hamburg physicist Harteck, independently of himself, had suggested the same possibility, that Houtermans consented to restricted publication of his article.* At this period of daily air raids on the country there was in any case no longer any question of the German project succeeding. Such is the explanation of the fact that at the end of the war one of the most important publications relating to German nuclear research was found among the secret "Research Reports of the Post Office." It was entitled: "Problem of the Release of Nuclear Chain Reactions."

Houtermans, despite his own political peril, naturally got into direct communication with Heisenberg and Weizsäcker, soon after his release by the Gestapo. He wanted to learn from their own lips just what the object of the Uranium Society was. He received the consoling information that every effort was to be concentrated on the problem of a "uranium machine" with the intention of progressively diverting the attention of the government departments from the possibility of the bomb. In the winter of 1941 he had a further confidential interview with Weizsäcker. He informed him of his own studies with Ardenne and said that he had kept quiet about the possibilities which those studies had established of the construction of an atomic weapon. Houtermans's confession encouraged his companion himself to be more frank than before. After a long discussion the two men agreed that the first and most important task of "uranium policy" must be to keep the departments in the dark about the now imminent feasibility of manufacturing such bombs. Heisenberg and Weizsäcker also assured Houtermans that they would treat his own studies accordingly if they ever came across them officially.

* Harteck had been a pupil of Rutherford. Shortly before the end of the war the Hamburg experimental physicist P. Koch denounced him to the Gestapo for "sabotage of atomic research." Koch committed suicide after the Allies entered Germany.

(1939-1942)

In addition to these three men there were at that time at least ten other prominent German physicists who had agreed that they must try to avoid working with Hitler's war machine or to make only a pretense of doing so. The names of German physicists unwilling to supply Hitler with supplementary armaments were deposited, after the war had begun, in Sweden—with Professor Westgren—and in Holland—with Professor Burgers. It was considered that an open strike of research workers would be dangerous, as it would leave the field open for unscrupulous and ambitious persons. So long as a policy of delay and postponement proved practicable, it was resolved that the risk should be taken. But at least some atomic scientists considered that when such a course could no longer be followed it would be their duty to take an active part in politics. They therefore kept in touch with the party of conspirators led by General Beck and the Chief Burgomaster of Leipzig, Gördeler.

These physicists, some of whom had decided upon a policy of passive resistance only after an extremely hard struggle with their consciences, did not form by any means an organized and compact body. They just knew who "belonged." If a newcomer attached himself to the circle, he was discreetly sounded. The process began with the exchange of harmless political jokes, continued with certain criticisms, at first mild, of the regime and gradually approached more and more dangerous topics. The well-known nuclear physicist Haxel remembers: "By slow degrees more and more pledges of mutual confidence were given on both sides till eventually each of us, so to speak, carried the other's life in his hands. At that moment we began at last to talk freely together."

The favored meeting spot for the heretical German atomic scientists was either the Berlin office of Dr. Paul Rosbaud, the publisher of scientific books and periodicals, or his modest home in the suburb of Teltow. Rosbaud, a temperamental Austrian who knew most of his authors intimately, showed a courage bordering upon recklessness in dealing with the Gestapo. If anyone may claim to have been the soul of passive resistance of German scientists to Hitler, it is this warm-hearted man. In the

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DRAFT OF COLLECTION MEMORANDUM

OBJECT

1. This Memo sets forth the current intelligence requirements in the field of Flying Saucer type aircraft.

GENERAL

1. An alleged "Flying Saucer" type aircraft or object in flight, approximating the shape of a disc, has been reported by many observers from widely scattered places, such as the United States, Alaska, Canada, Hungary, the Island of Guam, and Japan. This object has been reported by many competent observers, including USAF rated officers. Sightings have been made from the ground as well as from the air.

2. Commonly reported features that are very significant and which may aid in the investigation are as follows:

- a. Relatively flat bottom with extreme light-reflecting ability.
- b. Absence of sound except for an occasional roar when operating under super performance conditions.
- c. Extreme maneuverability and apparent ability to almost hover.
- d. A plan form approximating that of an oval or disc with a dome shape on the top surface.
- e. The absence of an exhaust trail except in a few instances when it was reported to have a bluish color, like a Diesel exhaust, which persisted for approximately one hour. Other reports indicated a brownish smoke trail that could be the results of a special catalyst or chemical agent for extra power.
- f. The ability to quickly disappear by high speed or by complete disintegration.
- g. The ability to suddenly appear without warning as if from an extremely high altitude.
- h. The size most reported approximated that of a C-54 or Constellation type aircraft.
- i. The ability to group together very quickly in a tight formation when more than one aircraft are together.
- j. Evasive action ability indicates possibility of being manually operated, or possibly by electronic or remote control devices.
- k. Under certain power conditions, the craft seems to have the ability to cut a clear path through clouds -- width of path estimated to be approximately one-half mile. Only one incident indicated this phenomenon.

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3. The first sightings in the U.S. were reported around the middle of May. The last reported sightings took place in Toronto, Canada, 14 September. The greatest activity in the U.S. was during the last week of June and the first week of July.

4. This strange object, or phenomenon, may be considered, in view of certain observations, as long-range aircraft capable of a high rate of climb, high cruising speed and highly maneuverable and capable of being flown in very tight formation. For the purpose of analysis and evaluation of these so-called "flying saucers", the object sighted is being assumed to be a manned craft of unknown origin. While there remains the possibility of Russian manufacture, based on the perspective thinking and actual accomplishments of the Germans, it is the considered opinion of some elements that the object may in fact represent an interplanetary craft of some kind.

5. There is also a possibility that the Horton brothers' perspective thinking may have inspired this type of aircraft - particularly the "Parabola", which has a crescent plan form. Records show only that a glider version was built of this type aircraft. It is reported to have been built in Heiligenberg, Germany, but was destroyed by fire before having ever been flown. The Horton brothers' latent trend of perspective thinking was definitely toward aircraft configurations of low aspect ratio. The younger brother, Riemar, stated that the "Parabola" configuration would have the least induced drag - which is a very significant statement. The theory supporting this statement should be obtained if possible.

6. The German High Command indicated a definite interest in the Horton type of flying wing and were about to embark on a rigorous campaign to develop such aircraft during the end of the war. A Horton design, known as the IX, which was designated as the Go-8-229 and Go-P-60 (night fighter) was to be manufactured by the Gotha Plant. It is reported that a contract for fifty such aircraft was planned, but only three or four were built. This plant is now in the hands of the Russians.

REQUIREMENTS

1. Requirements appear at Incomuro No. 1.

SPECIAL INSTRUCTIONS

Control No. A-1917

DISTRIBUTION

1. To MA's England, France, Sweden, Finland, USSR, Turkey, Greece, Iran, China, Norway, Philippines, and to Commander-in-Chief, Far East, and Commanding General, United States Air Forces in Europe, through Commanding General, EUCOM.

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DRAFT INCLOSURE NO. 1

1. Research and Development

- a. What German scientists had a better-than-average knowledge of the Horten brothers' work and perspective thinking; where are these scientists now located, and what is their present activity? These should be contacted and interrogated.
- b. What is the present activity of the Horten brothers, Walter and Riemar?
- c. What is known of the whereabouts of the entire Horten family, particularly the sister? All should be contacted and interrogated regarding any contemplated plans or perspective thinking of the Horten brothers, and any interest shown by the Russians to develop their aircraft.
- d. Are any efforts being made to develop the Horten "Parabola" or modify this configuration to approximate an oval or disc?
- e. What is the Horten perspective thinking on internal controls or controls that are effective mainly by streams of air or gas originating from within the aircraft to supplant conventional external surface controls?

2. Control

For any aircraft whose shape approximates that of an oval, disc, or saucer, information regarding the following items is requested:

- a. Boundary layer control method by suction, blowing, or a combination of both.
- b. Special controls for effective maneuverability at very slow speeds or extremely high altitudes.
- c. Openings in either the leading edge top and bottom surfaces that are employed chiefly to accomplish boundary layer control or for the purpose of reducing the induced drag. Any openings in the leading edge should be reported and described as to shape, size, etc. This investigation is significant to justify a disc shape configuration for long-range application.
- d. Approximate airfoil shape in the center and near the tips.
- e. Front view and rear view shape.

3. Items of Construction

- a. Type of material, whether metal, ferrous, non-ferrous, or non-metallic.
- b. Composite or sandwich construction utilizing various combinations of metals, metallic foils, plastics, and perhaps balsa wood or similar materials.
- c. Unusual fabrication methods to achieve extreme light weight and structural stability.

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Items of Arrangement

- a. Special provisions such as retractable domes to provide unusual observation for the pilot or crew members.
- b. Crew number and accomodation facilities.
- c. Pressurized cabin equipment.
- d. High altitude or high speed escapement methods.
- e. Methods of pressurization or supercharging from auxillary units or from the prime power plant.
- f. Provisions for towing - especially with short fixed bar, and for re-fueling in flight.
- g. Provisions for assisted take off application.
- h. Unusual features or provisions regarding the opening and closing of the doors.
- i. Bomb bay provisions, such as dimensions and approximate location.

j. Landing Gear

- a. Indicate type of landing gear - whether conventional, tricycle, multiple wheel, etc., or of an unconventional type such as tripod or skid.
- b. Retractable, and jettison features for hand gear.
- c. Provisions for takeoff from ice, snow, sand or water.

6. Power Plant

- a. Information is needed regarding the propulsion system used in the aircraft. Possible types of engines that could be employed include:
 - (1) Reciprocating (piston type) engine or gas turbine. Either or both of these could be used to drive propellers of conventional or special design, rotating vanes, ducted fans, or compressors.
 - (2) Jet propulsion engines including turbo jets, rockets, ramjets, pulse jets, or a combination of all four.
 - (3) Nuclear propulsion (atomic energy). Atomic energy engines would probably be unlike any familiar type of engine, although atomic energy might be employed in combination with any of the above types.

Aircraft would be characterized by lack of fuel systems and fuel storage space.

The presence of an unconventional or unusual type of propulsion system cannot be ruled out and should be considered of great interest.

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- b. The power plant would likely be an integral part of the aircraft and could possibly not be distinguished as an item separate from the aircraft. If jet propulsion is used, large air handling capacity, characterized by a large air inlet and large exhaust nozzle, should be evident. The size of entrance and exit areas would be of interest. It is possible that the propulsive jet is governed or influenced for control of the aircraft. The presence of vanes or control surfaces in the exhaust or methods of changing the direction of the jet should be observed.
- c. Information desired on the propulsion systems pertains to the following items:
- (1) Type of power plant or power plants.
 - (2) General description.
 - (3) Rating (thrust, horsepower, or air flow).
 - (4) Type of fuel, or, conversely, lack of visible fuel supply.
 - (5) Catalytic agents for super-performance or normal cruising power.

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