

INCEPTION ATOMIC BOMB PROJECT 1939-1940.
PRESENTATION OF IDEA TO PRESIDENT ROOSEVELT

By

Doctors Albert Einstein and Alexander Sachs

August - October, 1939.

AND FOSTERING DIRECTION OF EARLY DEVELOPMENT
TO mid-1940 by Dr. Lyman J. Briggs, Head of
Bureau of Standards, Department of Commerce,
and Chairman of Presidential Committee with
Dr. Einstein, Dr. Sachs and Dr. Pegrin, as
Co-ordinating Members.

~~SECRET~~ DOCUMENT ^{History} HISTORY *

By

Alexander Sachs

August 8, 1945.

OUTLINE OF THE HISTORICAL SOURCE-MATERIAL on
THE PRESENTATION TO THE PRESIDENT BY
ALBERT EINSTEIN AND ALEXANDER SACHS
IN THE AUTUMN of 1939, OF THE APPLICATION OF
A PROJECT FOR THE UTILIZATION OF ATOMIC
DISINTEGRATION FOR NATIONAL DEFENSE AND
RELATED PURPOSES.

HISTORICAL COURSE OF THE PROJECT UNTIL THE
ASSUMPTION OF RESPONSIBILITY FOR ITS EXECUTION
BY OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT,
NEWLY ESTABLISHED IN THE WAKE OF THE ENTRY OF THE
NATION UPON NATIONAL DEFENSE UP TO THE FALL OF FRANCE.

Manuscript Atomic Bomb Research Project 1939-40
Presented to
President Roosevelt 30th Nov. 1939
by Albert Einstein & Alexander Sachs
October 1939
9 *Lab. Bureau of Standards, with Dr. Lyman Briggs,*
Chairman of Presidential Committee.

Summary Document 1725 1/26
Alexander Sachs

August 8/40

October 12, 1939, conference at the White House - finally arranged for and effected on October 11th - as a result of efforts by Alexander Sachs since late August on the basis of letter from Dr. Einstein of August 2nd, delay having been due to events prior and subsequent to the outbreak of the war and the President's preoccupation with the revision of the Neutrality Act.

At this conference Alexander Sachs presented to the President Dr. Einstein's letter of August 2, 1939, and went over his own covering letter of October 11th and the redraft which he had made of the memorandum of Dr. Szilard of the end of August, 1939.

It was at this conference that the President effected an introduction of Alexander Sachs to General Edwin M. Watson, his secretary. General Watson in turn arranged for a meeting with Dr. Lyman J. Briggs, Director of the National Bureau of Standards of the United States Department of Commerce.

PREFACE

commented strongly
with the aid of the War Relocation Authority to
significance of nuclear fission and its
for national defense in respect to the

I. A.

August, 1939, ~~collaboration between~~ Doctors Albert Einstein, and Leo Szilard
and Alexander Sachs, on the letter and memorandum for the President on the
significance of for national defense of recent experimental research at Columbia
University by Doctors E. Fermi and L. Szilard on uranium, and recommendation for
the acceptance of such research in view of the German embargo on the sale of
uranium from the Czechoslovakian mines, and the prosecution of similar research
on uranium at the Kaiser-Wilhelm-Institute in Berlin.

into
Central
1 Nov 39
by W. C.
collaboration
of this time
in a paper
lectures

1a - letter of Dr. Albert Einstein to then President dated August 2, 1939.

1b - memorandum of Dr. Leo Szilard dated August 15, 1939, on the recent
work on atomic disintegration its national importance to the United
States, and recommendation for the acquisition of a pitchblend from
Belgium or the Belgian Congo, and the assumption of the successful
demonstration of a chain reaction of fast neutrons.

"Experiments have been devised for settling this important
point - whether a fast neutron reaction can be made to work; it is
solely a question of organization to insure that such experiments be
carried out."

"There is reason to believe that if fast neutrons could be
used, it would be easy to construct extremely dangerous bombs that would
go far beyond all military conceptions, and that could be transported by
boat and exploded in port with disastrous results.

V. 'cont.)

ADDENDUM TO IV or V. ~~Rescheduling~~

Re April meeting. Originally the April meeting was scheduled by Dr. Briggs for April 22nd. Those invited were Professor Einstein, Dean Pegrum and the writer, as appears from Exhibit 11a. Then Dr. Briggs by telegram of April 20th the meeting was postponed to the 27th (Ex. 11b)

In the same letter referred to above called KPM
May 11, 40

In the course of April writer had a succession of conferences with Dr. Einstein as one group, Dr. Wigner and Dr. Szilard as another group, and Dr. Fermi and Szilard as another group. The month having been marked by the German invasion of Norway and Denmark on April 9th and the counter operation of the British in their landing in Norway on April 16th and 18th, writer had sought to relate and assume favorable outcomes of the uranium experiments to Naval operations. As this in turn required the use of certain Naval facts and factors as a framework, he sought the aid of Naval officers. Dr. Briggs with whom he discussed this matter kindly undertook to submit a request for data to Admiral Bowen and Commander Hoover, accordingly Dr. Briggs' good offices were utilized as appears from the writer's letter to him of April 23, 1940 (Exhibit 12). Though, no copy has been preserved of the final form of the request for data, a longer memorandum as a aid-memoir of the accumulated progress was prepared at the time and has been preserved. As this memorandum of April 20th is rather long, a summary is submitted as exhibit 12.

(Referring to the meeting of April 27th) the discussions to be described later that the writer had with the scientists on the military applications reinforced the desire for enlargement of the conference group that was called together by Dr. Briggs for the meeting of April 27th. Accordingly in a telegram of April 26th referred to that part of the discussions with Dr. Einstein that produced the joint "proposals" for carrying forward the work with greater speed and more adequate scale than hitherto", as appears from the day letter of April 26th (marked Ex. 11c). In the same connection Dr. Einstein wrote on April 25, 1940, to Dr. Briggs recording his conviction "as to the wisdom and urgency as to creating the conditions under which that work can be carried out in greater speed and on a larger scale than he hitherto" and indicated that he was sympathetic to the suggestion made by the writer than "THE SPECIAL ADVISORY COMMITTEE" submit the names of persons to serve as a board of trustees for a non-profit organization which with the approval of the Government Committee should secure from the Government or private sources, or both, the necessary funds for carrying out the work. (letter marked Ex. 12a), but Dr. Briggs on the other hand, in his telegraphic reply of April 26th deemed it best to limit the meeting to the Advisory Group that had been appointed by the President, consisting of Dr. Einstein, Pegram and the writer. (marked Ex. 11d)

reported respectively in Naturwiss. 27, 11 (1939) and Nature (1)
(Feb. 1939),
which in turn had been duplicated by
I. Prelude to Presentation of Project to President Roosevelt.

By Spring, 1939, there was completed in the Physics Laboratories at Columbia University an advance upon the uranium researches in Europe of Drs. ~~Prof.~~ O. Hahn and L. Strassmann, and ~~the~~ supplementary researches of Dr. L. Meitner and P. Frisch (the latter noted in the February, 1939, issue of "NATURE, LONDON".) ~~This European work on the fission of uranium was independently and by different method carried out, by Professor Fermi and others in the United States,~~

The advance made by Dr. Leo Szilard was reported under the title "Instantaneous Emission of Fast Neutrons in Inter-action of Slow Neutrons with Uranium" and was published April 15, 1939, issue of "THE PHYSICAL REVIEW" (manuscript from Columbia University Physics Laboratory was dated March 16, 1939).

The cumulative researches of Dr. E. Fermi and L. Szilard which had been communicated in manuscript to Dr. Einstein led him in conferences first with L. Szilard and then with Alexander Sachs to develop jointly the implications of the imminent discoveries for the world situation, on the assumption that Germany would go to war. It so happened that in memorandum of last mentioned, Alexander Sachs, economist, had just prior to the Nazi seizure of Prague and Czechoslovakia placed as is evident from the title "The Imminence of World War in Perspective, Accrued Errors and Cultural Crisis of the Inter-war Decades." ; (Exhibit No. 1, dated March 10, 1939, "~~Notes on Imminence of World War~~" "Notes on Imminence of World War in Perspective, Accrued Errors and Cultural Crisis of the Inter-war Decades". The author of that memorandum was then at the time sensitive to the concern over the need of what he called in the concluding sentence "the preparedness that will become inevitable because of the consequences of the accumulated errors of the victors of the last war and the prospectively unfolding aggressions of Nazi Germany!" The further developments of the period that had come to the attention of Dr. Einstein was that subsequent to the seizure of Prague in mid March, 1939, Germany stopped the sale of uranium from the Czechoslovakian mines. This was related by Dr. Einstein to the dual fact that the recent work on uranium carried on outside of Germany by predominately refugee scientists was being watched and repeated by German scientists at the Kaiser-Wilhelm-Institut in Berlin and that a son of the German Under-secretary of State, von Weizsacker, has been attached to the Institut.

While among the physicists there were doubts entertained by the further developments, Dr. Einstein accepted the possibility that the nuclear chain reaction could be set up in a mass of uranium by which vast amounts of power would be generated; and he carried the new phenomenon a stage further to the eventuality that extremely powerful bombs of a new type could be thereby constructed; "a single bomb of this type carried by boat and exploded in a port might very well destroy the whole port together with some of the surrounding territory"

In view of the foregoing developments and concern for the world in the event of and on the assumption of German aggressions on the peace of the world, it was agreed, by Dr. Einstein and his colleagues, that the situation and its implications should be brought to the attention of the president.

Though the experimentalists were uncertain whether a fast neutron reaction could be made to work, the far-reaching military consequences from such a possibility were such that here on it was deemed essential that the researches

in England, France and the United States be somehow kept from Nazi Germany, and indeed a proposal to the effect for the withholding of the publication on chain reaction was already submitted ~~to the Westerners~~ and while it was received with favor by the Western scientists, the proposal was looked at askance in France. Finally, since the largest supply of good ore was in the Belgian Congo and as new phases of the experiment could not be carried out within the limited budget of universities, it was deemed by this group that the aid of the government was, even from an economic standpoint, necessary, if only to indicate to public spirited private persons and corporations that the ensuing research would be invested with a special national significance.

In view of all these considerations of development, it was finally agreed that to be effective the presentation to the president must be direct and under conditions that would permit the spelling out of the cumulative implications and consequences for the nation; and this task was entrusted to the economist and political-scientist member of the group by reason of his long association with the President as a informal advisor and friend.

Upon the completion of the of the letter of Dr. Einstein to President Roosevelt dated August 2nd and the supplementary memorandum by Doctor Szilard dated August 15th, 1939, came the German demands upon Poland and the invasion of Poland on September 1st, culminating with the fall of Warsaw on the 27th, the attendant and ensuing presidential concern with guiding through Congress a revision of the Neutrality Act served to delay the arrangement of a meeting for the writer with the president. Only after the first week of September was it possible to arrange an interview with the president and conference with his aides delegated for the consideration of the problem and the proposals.

II.

Conference at the White House on October 11, 1939, and the appointment of a committee headed by Dr. Lyman J. Briggs, Director of the Bureau of Standards to pass upon the project.

1. At the conference with the president at the White House on October 11th writer presented a review of the following collect of material:

- (a) Dr. Einstein's letter of August 2, 1939 (marked herein as Ex. 2A)
- (b) Memorandum of Dr. Szilard of August 15, 1939 (marked herein as Ex. 2b)
- (c) copies of articles that have appeared in scientific journals (of which only the report of Dr. Szilard's communication to THE PHYSICAL REVIEW dated April 15, 1939, is herewith enclosed marked Ex. 2c)

~~Writer orally and in his covering memorandum letter dated October 11, 1939 on behalf of Dr. Einstein and himself~~

On behalf of Dr. Einstein and himself the writer orally ~~and~~ in the course of the conference and in his covering memorandum letter of October 11, 1939 (marked herein as Ex. 3) made the following requests:-

- (a) liaison at the White House
- (b) committee of the services as a liaison between Army and Navy
- (c) with war having broken out and submarine operations begun, the securing of material from the Belgian Congo

In keeping with the theory already cited in writer's memorandum of March 10, 1939, (Ex. 1) ~~to the president~~ and writer's memorandum to the president of October 11, 1939, pointed to the danger of German invasion of Belgium and hence the ~~possibility of~~ advisability of taking steps then through diplomatic channels for the diversion of the Belgian uranium to the United States. In respect to the financial requirements of the project, it was suggested that, ~~if~~ assuming recognition by the government of the national significance of the research, funds could be secured either from "public spirited executives in chemical and electric companies or from foundations

2. In the wake of this conference the president asked his secretary and military aide, General ~~Wat~~ Edwin M. Watson, to act as a liaison ~~er~~ for the White House. General Watson was further asked by the president to effect an introduction to Dr. Lyman J. Briggs and to constitute in the president's behalf a committee of Dr. Briggs, Colonel Adamson of the Army and Commander Hoover of the Navy for the consideration of the ideas and material that had been submitted to him by Dr. Einstein and the writer. President further suggested that the writer stay over the following day for a conference with this newly appointed committee.

The conference on October 12th with Dr. Briggs led to the arrangement of a meeting for the end of the month between the government group and those concerned with this problem. (In addition to the formal invitations sent by Dr. Briggs the writer was asked to send an explanatory note to Professor Wigner, of Princeton, and Professor ~~Teller of George~~ Teller of George Washington University, (copy of which is included under the designation of Ex. 4). ~~The meeting held at the office~~

~~at the Bureau of Standards on Saturday morning, October 21, 1939, at 9:30.~~

With the exception of Dr. Einstein, whose health did not permit attendance at that or subsequent meetings, all those invited participated as follows at the meeting held in the office of Bureau of Standards on Saturday morning, October 21, 1939, at 9:30.

- (a) For the government - L. J. Briggs
Colonel Adamson
Commander Hoover
- (b) As Presidential representative - Alexander Sachs
- (c) As cooperating scientists - Professor Albert Einstein (who was unable to attend on account of health.
E. P. Wigner - (Professor Theoretical Physics at Princeton)
E. Teller (Professor, George Washington University)
E. E. Fermi (Professor, Columbia University)
L. Szilard (visiting experimental physicist at Columbia and Trustee of the Association of Scientific Collaboration)

In the course of the technical discussion at the meeting on October 21st objections were raised by some that those interested in the political-military implications were much too previous in pre-supposing that what was merely possible would become actual and so they urged that it was necessary for the government to concern itself at this time with the scope and pace of the research being carried on under the normal auspices of our educational institutions. Dr. Lyman Briggs in his official position as the Director of the Bureau of Standards and as presidential appointee ~~with~~ as chairman of the combined group observed that national considerations justified the mental extension of the ~~fa~~ available possibilities with a view to arriving at an estimation of the national interest in facilitating and accelerating the course of development: it was on the note that the governmental part of the group would thus approach the problem sympathetically that the conference ended.

3. The inter-departmental committee appointed by the President submitted on November 1, 1939, a preliminary report of ~~this~~ its findings and recommendations with regard to the subject that had been set by the President: POSSIBLE USE OF URANIUM FOR SUBMARINE POWER AND HIGH DESTRUCTIVE BOMBS". The report of the committee - L. J. Briggs, chairman, Keith Adamson, Lt. Colonel U S A and Gilbert C. Hoover, Commander U S N - opened with a reference to the meetings of the committee "with Ale Dr. Alexander Sachs and the physicists from Columbia, Princeton and other institutions", and described the recent work, and set forth the possible applications to submarine power and explosives inherent in the possible successful release of accumulated atom splitting in the form of a general reaction. Because of the historic interest of this formulation by the governmental committee of the projected developments, it is desirable to present the full text of the main findings.

(1) Discoveries made within the last year have shown that when a uranium atom is bombarded by neutrons (uncharged elemental particles of matter) from an outside source, the uranium atom may be split in two and this breakdown is accompanied by the release of a great amount of atomic energy.

(2) When the uranium atom is split it likewise sets neutrons free. These neutrons may be able in turn to split other uranium atoms and thus continue the process as a chain reaction. This continuous splitting has not so far been accomplished. The proposed research would be directed to finding a way to do it.

(3) The energy released by the splitting of a mass of uranium atoms would develop a great amount of heat. If the chain reaction could be controlled so as to proceed gradually it might conceivably be used as a continuous source of power in submarines, thus avoiding the use of large storage ~~batt~~ batteries for under-water power.

(4) If the reaction turned out to be explosive in character it would provide a possible source of bombs with a destructiveness vastly greater than anything now known.

While deeming that such a general reaction has not yet been demonstrated, the committee next gave as its major conclusion the following:-

) copy 5 para. when material received from Commerce)

In furtherance of that he proposed that initial support - funds for which committee expected to secure from the enactment of the Lea Bill - be given to -

- (a) supplying for immediate experimental work 4 metric tons of pure-grade graphite, and
- (b) if later justified, supplying 50 tons of uranium oxide.

Finally it recommended under the concluding paragraph 8 - by letter of Dr. Briggs to the President of November 1, 1939 - that the committee be thanked for the support and coordination of these investigations in different universities, and that the following be invited to constitute a coordinating group:-

President Karl Compton, Massachusetts Institute of Technology
 Cambridge, Massachusetts
 Dr. Alexander Sachs - One William Street, New York
 Professor Albert Einstein, Princeton University, Princeton, N.J.
 Dean George B. Pegram, *Columbia*

III of 3.

Then an interlude of activity ensued, approximately coincidental with the then denominated phoney war between the fall of Poland and the invasion of Norway. The President was preoccupied with numerous internal and international problems. General Watson, as liaison, felt that the report of November 1st was not sufficiently pointed, and accordingly in transmitting its text to the writer on February 8, 1940, - having previously conveyed merely its general tenor - stated that he was asking "for a special recommendation from Dr. Briggs".

Meanwhile, progress was concentrated in the organization and the functioning of the coordinating committee mentioned in the conclusion of point 8 of Dr. Briggs' report to the President of November 1, 1939. Conferences were had between the group at Columbia University - consisting of Drs. Pegrarn, Fermi and Szilard - with the writer as presidential advisor and intermediary. In mid-November an octet of experimental projects was projected at-C by the Columbia group with a view to securing a number of subsidiary questions, in the hope that these could be vigorously pursued so that reports could be made within a period of six months. Based on notes made at the time, the definition and scope of the subsidiary questions and the recommended personnel from nearby educational institutions as projected were as follows:-

1. Slow Neutron Reaction:
Fermi, Pegrarn, Szilard (all Columbia) Wheeler (Princeton)
2. Fast Neutron Reaction:
Fermi, Szilard Tuve (Carnegie Institute) Wigner (Princeton)
3. The Question which of the Uranium Isotopes splits:
Dunning (Columbia) Fermi, Tuve, Wheeler.
4. Small Scale Separation of Isotopes by any Method except Diffusion:
Beams (Univ. Virginia) Fermi, Tuve.
5. Small Scale Separation of Isotopes by Diffusion:
Fermi, Furry (Harvard) Urey (Columbia)
6. Theoretical Possibility and Limitation of Large Scale Separation by
Centrifuging:
Beams, Pegrarn, Szilard, Teller (George Washington Univ.)
7. Theoretical Possibility and Limitation of Large Scale Separation by Diffusion:
Fermi, Furry, Onsager (Yale) Urey.
8. Possibility of Large Scale Production of Uranium Metal:
Pegrarn, Szilard, and somebody from the Department for Chemical
Engineering of MIT or Columbia.

In particular, the projects at Columbia came to receive limited aid for the purchase of materials, as is evident from the reply of February 20th, by the Director Lyman H. Briggs to General Watson's memorandum of February 8, 1940 (this exchange of correspondence being marked respectively Ex. 6A and 6B).

The writer as co-initiator with Dr. Einstein, of the original project conferred with Dr. Einstein in February at Princeton and learned of his judgment that the work progressing at Columbia was ~~more~~ more significant than that at Paris, as reported in "SCIENCE". Hence in anticipation of Dr. Briggs' reply to General Watson -(Ex. 6B) - a letter was written to General Watson under date of February 15 pleading for larger and more interested aid and promising an evaluation in the near future from Dr. Einstein of the work being completed at Columbia (marked Ex.6C)

I. Prelude to Presentation of Project to President Roosevelt.

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The advance made by ^{collaborator of Dr. Enrico Fermi} Dr. Leo Szilard was reported under the title "Instantaneous Emission of Fast Neutrons in Interaction of Slow Neutrons with Uranium" and was published April 15, 1939, issue of "THE PHYSICAL REVIEW" (manuscript from Columbia University Physics Laboratory was dated March 16, 1939).

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2. In the wake of this conference the president asked his secretary and military aide, General ~~Wat~~ Edwin M. Watson, to act as liaison ~~of~~ for the White House. General Watson was further asked by the president to effect an introduction to Dr. Lyman J. Briggs and to constitute in the president's behalf a committee of Dr. Briggs, Colonel Adamson of the Army and Commander Hoover of the Navy for the consideration of the ideas and material that had been submitted to him by Dr. Einstein and the writer. President further suggested that the writer stay over the following day for a conference with this newly appointed committee.

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Handwritten notes and signatures:
O. M. ...
H. Reich F.
...

~~of the Bureau of Standards on Saturday morning, October 21, 1939, at 9:30~~

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R

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*considering
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the project committee

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- (a) supplying for immediate experimental work 4 metric tons of pure-grade graphite, and
- (b) if later justified, supplying 50 tons of uranium oxide.

Finally it recommended under the concluding paragraph 8 - by letter of Dr. Briggs to the President of November 1, 1939 - that the committee be enlarged for the support and coordination of these investigations in different universities, and that the following be invited to constitute a coordinating group:-

President Karl Compton, Massachusetts Institute of Technology
Cambridge, Massachusetts

Dr. Alexander Sachs - One William Street, New York

Professor Albert Einstein, Princeton University, Princeton, N.J.

Dean George B. Pegram, *Columbia Univ. N.Y.C.*

III ~~of 3.~~

Then an interlude of activity ensued, approximately coincidental with the then denominated phoney war between the fall of Poland and the invasion of Norway. The President was preoccupied with numerous internal and international problems. General Watson, as liaison, felt that the report of November 1st was not sufficiently pointed, and accordingly in transmitting its text to the writer on February 8, 1940, - having previously conveyed merely its general tenor - stated that he was asking "for a special recommendation from Dr. Briggs".

Meanwhile, progress was concentrated in the organization and the functioning of the coordinating committee mentioned in the conclusion of point 8 of Dr. Briggs' report to the President of November 1, 1939. Conferences were had between the groups at Columbia University - consisting of Drs. Pegram, Fermi and Szilard - with the writer as presidential advisor and intermediary. In mid-November an octet of experimental projects was projected at C by the Columbia group with a view to securing a number of subsidiary questions, in the hope that these could be vigorously pursued so that reports could be made within a period of six months. Based on notes made at the time, the definition and scope of the subsidiary questions and the recommended personnel from nearby educational institutions as projected were as follows:-

1. Slow Neutron Reactions:
Fermi, Pegram, Szilard (all Columbia) Wheeler (Princeton)
2. Fast Neutron Reactions:
Fermi, Szilard Tuve (Carnegie Institute) Wigner (Princeton)
3. The Question which of the Uranium Isotopes splits:
Dunning (Columbia), Fermi, Tuve, Wheeler,
4. Small Scale Separation of Isotopes by any Method except Diffusion:
Beams (Univ. Virginia), Fermi, Tuve,
5. Small Scale Separation of Isotopes by Diffusion:
Fermi, Furry (Harvard), Urey (Columbia)
6. Theoretical Possibility and Limitation of Large Scale Separation by Centrifuging:
Beams, Pegram, Szilard, Teller (George Washington Univ.)
7. Theoretical Possibility and Limitation of Large Scale Separation by Diffusion:
Fermi, Furry, Onsager (Yale) Urey.
8. Possibility of Large Scale Production of Uranium Metal:
Pegram, Szilard, and somebody from the Department for Chemical Engineering of MIT or Columbia.

In particular, the projects at Columbia came to receive limited aid for the purchase of materials, as is evident from the reply of February 20th, by the Director Lyman H. Briggs to General Watson's memorandum of February 8, 1940 (this exchange of correspondence being marked respectively Ex. 6A and 6B).

The writer as co-initiator with Dr. Einstein, of the original project conferred with Dr. Einstein in February at Princeton and learned of his judgment that the work progressing at Columbia was ~~more~~ more significant than that at Paris, as reported in "SCIENCE". Hence in anticipation of Dr. Briggs' reply to General Watson - (Ex. 6B) - a letter was written to General Watson under date of February 15 pleading for larger and more interested aid and promising an evaluation in the near future from Dr. Einstein of the work being completed at Columbia (marked Ex. 6C)

Early the following month Dr. Einstein upon submission of his view to the President wrote me under date of March 7, 1940, from Princeton, reviewing the development since the conferences I had arranged in Washington in October between the scientists engaged in the uranium research and the governmental committee appointed by the President. (A copy of Dr. Einstein's letter to me - original having been later forwarded to the President - submitted herewith as Ex. 7a) The letter referred to the intensification of interest in uranium in Germany, judging by the German government's taking over of both the chemical and the physic institutes and the placement of the research under the leadership of C. F. von Weizsaecker in substitution for the retired director. A week later the writer sent to the ~~Professor~~ President Dr. Einstein's review and asked for an opportunity to confer on the latest phase of the experimental work (marked Ex. 7b) ~~At the turn of April at a conference in the White House at which the writer unfolded some views on the probably course of the German aggression in the course of the Spring and summer campaigns for the mastery of the coast opposite England from Norway through France, the uranium project was once more pressed and the writer urged that a liberal fund be made available as distinguished from the delimited reimbursement fund for material purchases as under Dr. Briggs' procedure. Indeed the late Spring months must be utilized to preempt and academic talents for research as distinguished from seasonal appointments for teaching.~~

At the end of the month a note was received from General Watson under date of March 27, 1940, to the effect that the work was proceeding satisfactorily and that "the matter should rest in abeyance until we get the *official* report" (marked herein Ex. 7c), but a sense of foreboding with respect to Nazi aggression that characterized the writer the previous year (as was voiced in the memorandum of March 10, 1939, No. 1) impelled the writer to the conviction that what was called at the time the phoney war was bound to be replaced by unrushng waves of unresisted Nazi aggression through Western Europe. At the turn of April at a conference in the White House at which the writer unfolded some views on the probable course of the German aggression in the course of the Spring and summer ~~campaign~~ campaigns for the mastery of the coast opposite England from Norway through France, the uranium project w was once more pressed and the writer urged that a liberal fund be made available as distinguished from the delimited reimbursements fund for material purchases as under Dr. Briggs' procedure. Indeed the late Spring months must be utilized to preempt academic talents for research as distinguished from seasonal appointments for teaching. (The statements and recommendations then made were embodied in an aide-memoir which was prepared at Washington and left at the White House and a copy if presented herewith as Exhibit 7c)

Then harkening back to the previous correspondence, letter of March 15th (Ex. 7b) the President advised the writer under date of April 5, 1940, that he had asked General Watson "to arrange another meeting in Washington at a time convenient for you and Dr. Einstein". He concluded with his reaffirmation that "I shall always be interested in these results." (marked Ex. 8a) Under even date General Watson asked the writer for a list of scientists to be invited and for the writer's colicitation of Dr. Einstein's suggestions - this letter being included herein as Ex. 8b) In furtherance of General Watson's request writer had inquiries made of Dr. Einstein and a composite list was submitted to General Watson of those to be present at the next meeting with the governmental authorities (communication to General Watson by writer of April 19, 1940, being included as Ex. 8c)

The conference was held on April 27, 1940, at the Bureau of Standards under the chairmanship of Dr. Briggs. At this conference there was considerable discussion as to the matter of expenditure that would be required. At the instance of the writer and with ~~his~~ collaboration ~~of~~ Dr. Szilard prepared a memorandum for him that was placed in the record, describing two types of chain reaction. It is noteworthy that the second type - in which neutrons were not slowed down - was described under PART II as holding the promise "to bring about explosions of extraordinary intensity;"

"If for purposes of aggression ((or attack)) a bomb based on such a chain reaction was set off at sea near a port, the tidal waves brought about by the explosions might lead to the destruction of the coastal cities."
(included herein as Ex.9).

While the author indicated in the memorandum and in his oral presentation at the meeting that such a bomb required for its transportation larger and more powerful airplanes than the existing ones, it was voiced by the present writer as a student of technology and strategy that we must regard ~~such~~ technology of our weapons as in an incipient stage of development and that the resistance to Nazi aggression that the Western civilization has just embarked upon may be relied upon to solve this problem of transportation just as we are trying to solve the problem of harnessing the energy from atomic disintegration to offset or even to anticipate corresponding experiments being carried on in Germany.

It was still the view of the governmental group that the scale of operations remained the same as it had been under the auspices of university experimental projects and that the funds be held down to specific needs for material at the various experimental centers instead of according advance assurance to each center that it could go forward with a larger staff and on an accelerated basis for telescoping within a short compass of time the answers to its sector of the total problems.

SUPER-OUTLINE FOR PART I OF ARTICLE

1. Open with a description of the hesitancy of the scientists as given in the governmental release. Use also Oppenheimer's statement when the award was given to Los Alamos on, I believe, October 5th, as quoted in the Kilgore hearings. Connect it with the story of how Napier in the period of the religious wars of the 17th century destroyed a device that was analogous.

2. Then deal with the impact upon the scientists by relating it to the vision they have secured of the end of the universe. Give the summary of the scientific view of the cosmic history from Sir James Jeans' "The Mysterious Universe," Chapter 1. Feature the things developed with Riezler as earth and life as rare events now returning to a more normal distribution and probability.

3. How can the non-scientists who operates with more restricted histories - namely, histories of civilization and particularly the history of the modern age - obtain a reflection, however dim, of this apocalyptic sense? This will introduce the quartet of charts which for the first time give a synoptic statement of how, using the most elementary arithmetic measure of the number of war outbreaks a year occurring within the time-stretches, have behaved in relation to the statistical measure given by the law of rare events, or the Poisson law; and how as civilization has increased in industrialization and technology, the divergences have gotten greater; and now war is no longer a rare event. Follow up with the criteria in the other memoranda of E.J.G. Then deal with the unique entry of the time-factor analogous to the time-dimensions in the Mankovsky general theory of relativity.

4. The ending of this war has been apocalyptic in the terms of total technology of war weapons, not just the atomic bomb - though the atomic bomb is itself the greatest exemplar. The V bomb, the super-sonic planes, the picture of a war impact that can only be detected after the casualty and in an ultimate sense, after the war itself.

5. Contrast that with the picture of war as a contest between powers. Here the weapon is to eliminate the possibility of a contest. Our generation has had two such apocalyptic impacts: the Great Depression and what is now realized as a Thirty Years War. In the Great Depression for the first time a world that had felt it was going from strength to strength suddenly felt that the whole basis of life was dropping out. (Utilize A. J. Toynbee, 1931 Survey and especially the contrast with Gibbon.) In this Thirty Years War the first part of it left us with a desire and a universal expectation that we could return to normalcy. Everybody sought to reinstate 19th century systems and everybody felt that democracy and capitalism were thus vindicated. The one rift in the lute was Russia. As the reconstruction on the basis of normalcy broke down, first in economics, it led to a Hobbesian twilight state of a suspense for a war leap. The second half of the interwar period was characterized by a conflict of ideologies, both of which were played out during the war.

6. Now the atomic bomb is exerting a continuing radio-activity on our minds. We are realizing that though we have been victorious and though we have gotten an extraordinary sense of self-confidence from our technology and our managerial powers in the technical management of war, we somehow do not know how to liquidate this war. Last time we thought we successfully fought a war against war. Now we realize dimly that the war against war is our current task - that somehow we cannot make an effective peace between the victors of this war unless war itself is somehow mastered.

7. Now the peculiarity of this weapon is that it endangers everybody - that it is a reductio ad absurdum of war as an institution - that the disintegration of the atom is the instrument for disintegrating a civilization beyond reconstruction. Such is the challenge.

[Corrag - Pregel]

B.P. source 1/1/4

In 1925 it was demonstrated that protons can produce tracks in photographic emulsions, similar to those of alpha particles. This method was improved afterwards and used for the study of disintegration processes of atomic nucleus. Methods were indicated to calculate the energy of the protons by measuring the length of the tracks and the distance of the grains in the tracks.

In 1932 it was demonstrated that the recoil tracks of fast neutrons also can be made visible in photographic emulsions. In the following years photographic plates, especially prepared, were exposed in different places, at different altitudes, to investigate the component of heavy particles (neutrons, protons, alpha particles) in the cosmic radiation (Hafelecar, Austria - ^{Alphavertikalplan} Jungfraujoek, Switzerland, etc.).

In 1937 a new phenomenon was found, which can be described as the formation of disintegration stars. From a point in the photographic emulsion (atom of the emulsion), tracks of heavy particles originate. The only possible explanation is, that an atomic nucleus by the impact of a cosmic ray suffered a multiple disintegration, releasing a great number of particles (protons, neutrons and alpha particles). The nature of the emitted particles and their energy could be determined, and the total energy (minimum value) liberated in this process could be calculated. Depending upon the disintegrated nucleus and the energy of the radiation which produces the disintegration, different energies were found until 150 NeV per nucleus.

The theoretical explanation of this process is not established completely as yet. Probably it is some kind of evaporation or ionization of the nucleus itself. It is not yet known exactly what is the nature of the primary radiation which produces this kind of disintegration. It is known that it somehow is related to the soft component of the cosmic radiation, and that it is produced either by a heavy particle (proton or neutron), or by a very energetic light quantum (photon) which releases a heavy particle in the nucleus itself. This heavy particle on its way through the nucleus produces this evaporation.

The energies liberated by these processes are very high. If it is possible to produce radiation similar to cosmic radiation artificially, nearly every kind of atoms could be used for nuclear evaporation experiments producing enormous quantities of energy.

If it is confirmed that the evaporation can be produced, either by photons or neutrons, there is some possibility to produce artificially such evaporation by means of betatrons. If only protons or neutrons are responsible for this evaporation, powerful cyclotrons have to be used. (✓) Because many of the particles ejected by the evaporation process have very high energies, some kind of chain reaction can be expected.

(✓) It is known that protons of high energy can be released by photons of high energy, so that even in the case where the evaporation is due to protons or neutrons, a betatron is the most indicated apparatus.

BP Summary 1/4/41

NOTE: RUSSIAN EXPERIMENTS MENTIONED IN THE NEWSPAPERS

In a stratospheric flight of the balloon, Explorer II, conducted by the National Geographic Society and the U. S. Army Corps in 1936, Wilkins, Rumbaugh and Locher exposed photographic plates to cosmic rays; these authors found some heavy particles (alpha particles, protons and recoil protons produced by neutrons).

In experiments made at the Hafelecar (2300 m) (1936-37) with special photographic emulsions, a great number of proton tracks (170 per cm^2) were found (some of them with energies corresponding to 1 meter range in air). Many of the proton tracks were recoil tracks produced by neutrons, but a part of them must be due to primary protons.

Later experiments, for instance, by Heiller (1940), and others, proved the existence of protons in the cosmic radiation. A plausible mechanism for its production is a nuclear photo effect in which a cosmic ray photon releases a proton from a nucleus.

The above-mentioned experiments on "disintegration stars" suggest that many of the single tracks (protons and neutrons) are due to multiple nuclear disintegration.

Secondary effect (secondary nuclear disintegration) in lead and other materials were observed by many authors.

STILL FURTHER CONSIDERATIONS ON THE SOLUTION OF THE
PROBLEMS OF THE BOMB AND THE ENERGY DEVELOPMENTS

Further Conferences with E.P., November 11, 1945

1. What is being currently neglected is the probability that atomic energy by the method of fission will be displaced. There is greater probability that the next method will be evaporation of the nucleus. The Betatron built by General Electric generates 100 million volts. If we can build one that would generate half a billion volts it might suffice to evaporate the nucleus. This view ties in with an observation of Dr. J. C. Stearns as a member of the quartet of scientists - Drs. Szilard, Urey, Stearns and L. B. Borst - that addressed an informal gathering of Congressmen on November 8th. Dr. Stearns suggested the possibility that the energy could be created in the same way the sun does by transmuting hydrogen to helium. The other possibility is to utilize the billions of electron volts released by the mesotron, which exists in cosmic rays. Regarding the latter method, there will be very difficult problems of protecting the experimenters and the users.

Before the war experimentation in that direction was done by European scientists. There was an exposure of photographic plates on high altitudes like the Jungfrau, and it was then found that there were tracers to show that the silver had been evaporating. A report of that experiment which was conducted by Dr. Marietta Elau, who, like Liese Meitner worked with Dr. Hahn, was published in Nature or in Science (a copy will be supplied). One university is preparing to build such a machine.

It might be not more than six months to a year for this new revolution in the production of the atomic energy or explosive. In the evaporation process - the evaporation of the nucleus - we are not bound to uranium or thorium. In the

already alluded to case, the evaporation of the nucleus was of silver. Experimentation would have the whole gamut of elements from hydrogen to plutonium. The argument about the expensiveness of the raw material would disappear.

It is the probability of alternative methods that takes the props from under proposals like that of Mr. O'Neil in the Sunday Tribune of November 11th and the article in the New York Times Magazine by Mr. Davis also on November 11th. Both arguments are based on the assumption that only uranium would be used. So the first one thinks there can be detection from the radio-activity. But radio-activity might occur from other experiments going on and how can a specific use be inferred? This multiplicity of sources also affects the practicability of more economical production. Thorium is more frequent in desirable quantities. The countries having thorium are India, Australia, Brazil, Arabia and possibly Russia.

2. Regarding the writer's thesis about the opportunities opened up to misuse by political gangsters, P. accepts that thesis. One only needs to contemplate a Colonel Peron or other colonial groups. This provides an argument against uncontrolled or laissez-fairist type of research just as strongly as it provides an argument against nationalist research without international control. Expressed more strongly, neither internal nor international laissez-fairism can be free of the gravest peril. If there is internal laissez-fairism, then we lack, so to speak, an internal Sullivan law. If there is internal control in the democracies, but a lack of international accord, then the chances of smuggling and bootlegging would be increased.

It is a new age of tyrants, far graver than that which had occurred in Greece or in medieval Europe, that threatens the world. Indeed, weapons have become at once so potent and so economically measured by their efficacy that there is danger of capture for exploitation purposes of the resources of whole countries by gangsters

or dictators. Political buccaneerism and privateering will be enormously facilitated and the mere threat to blow up a city before aid could be sent might suffice to secure the capitulation of a whole government. Supposing that such an atomic bomb coup d'etat were secured. Only after there were an international concern could proper counter-measures be employed, starting with economic sanctions and consciously being ready for the consequences of it after a military follow-up was necessary.

The alternative production prospects are bound to affect the problem of control. If there were only one element then there could be control over the source of the raw material. But then we would have to be in a position to know whether the representation as to the use of the material checks up with what is being done. Supposing there is importation of uranium from Madagascar or thorium from Brazil. Tabs would have to be kept on whether it is really being used for medicinal experimentation. Again, the country importing might well be quite truthful in its representations. But there must be assurance that the internal policing is adequate against theft, let us say, or against misapplication by the scientists themselves who might be tempted to act unethically by foreign agents. This brings up the question as to whether the bomb experimentation should not, wherever it is conducted, be under international auspices with an international policing.

The stress herein is that the greatest danger would lie in the surreptitious use for high stakes. We will have to think out the types of incentive and motive.

The mere destruction of a city is not the worst of the dangers. It is the international hold-up that is the greater danger. A city like New York might disappear entirely, like the island Atlantis; and if it stopped there, it would be a calamity like an earthquake.

3. The view pressed by P. is that the only way to circumvent the dangers of the bomb is through the immediate and concerted development of the pacific uses. That, of course, presupposes the validity of the thesis that economic pressures give rise to the frictions that lead to war. The present writer does not accept that view. Nonetheless, there is something to the idea that economic maladjustments and frustrations provide a favorable conjuncture or catalyst for the reagents of belligerency. There is distortion of the truth when war is assimilated to the social situations of petty larceny, which is a function of the availability of an economic minimum.

4. Considerations of ~~the~~ the foregoing order point to the urgency of making a disposition now before the alternative methods are demonstrated as to practicability. We should utilize the fact that in the present situation there is fear by everybody from everybody. Booth Tarkington's short piece in the Tribune of November 11th is to the point: "It is time to be afraid."

"Before atomic bombs go into mass production, God give us grace to be cowardly enough to save ourselves by common sense. A shower of atomic bombs from Guatemala could write finis to the United States. From now on the nations are like a family in a house with walls built of dynamite, yet unable to move to another house. The Security Council of the United Nations could protect the world against the atomic bomb. It must have a force of international and scientifically trained inspectors, who must have access to every country. Aggressor countries could no longer be aggressive and exist under a Council able to insure the peace."

As to the international schism, the hypothesis that needs to be evaluated is the validity of the view that the Soviets will never wage an offensive war to introduce socialism in other countries. The time of military communism is gone. The internal situation is sufficiently delicate that a large army could not be used for an aggressive war against a major power. Instead, Russia needs peace for a couple of generations.

Another constructive factor that needs to be developed is that something

analogous to the impact upon medieval Europe of Islamic civilization from the Crusades has taken place as a by-product of the war. Millions of Russian soldiers have seen what life can be for the individual in Western civilization. The capitalist infidel, it has been found out, leads a comelier and more comfortable life.

On the other hand, Russia is not free of fear that the capitalist countries would engage in a preventive war. The co-existence of the socialist and capitalist worlds can be accepted by the Soviets because of the size and variety of its own territory.

Atomic energy can show the West how to make a reality of socialist pre-
tensions, thus increasing the attraction of ^{the} Western system for Russia. The more there is of development, the greater the prospect of eventual disarmament.

At the same time we must be ready for an interim of increased responsibilities. We need universal military training so that our youth becomes aware of the importance of the international situation for internal stability. Liberals should exert their influence to assure that that period of training is devoted to an understanding of other countries and our responsibilities.

Chiron

November 7, 1945

Dear Mr. Hellman

Thank you for your note of the 6th and the accompanying galleys. To facilitate your work, I am submitting a note embodying some corrections and suggestions.

With kind regards,

Sincerely yours,

Mr. Geoffrey T. Hellman
The New Yorker
25 West 45rd Street
New York City

NOTES ON DESIRED CHANGES AND CORRECTIONS

Galley 1

1. Line 11 - change "18" to "19".
2. Insert after 1951: "Two years after having become Director of Economic Research for the Lehman Corporation, and ... etc., etc."
3. Re clients: As I have not deemed it advisable to give an adequate list of clients, any featuring is apt to be invidious. I suggest the following substitution for this passage:

"Since then he has continued to serve as a Director of The Lehman Corporation and as economic advisor to it. In his consultant capacity he has prepared a special report for the War Emergency Pipelines Corporation, which during the war built petroleum pipelines from the Gulf of Mexico to the Atlantic Seaboard. In his public-professional capacity he has been an economic advisor to the Petroleum Industry War Council, an industrial agency set up by Harold Ickes as Petroleum Administrator in furtherance of the readjustment of the industry to the war tasks."

Galley 2

4. Change 4. to read as follows:

"Sachs is credited with having on occasion furnished Raymond Swing, Dorothy Thompson and Major George Fielding Eliot with interesting ideas."

Galley 4

5. Would appreciate omission of this passage, as it is reflection upon a President who applied himself to his tasks with a perseverance and a passion without parallel.

Galley 6

6. As the penultimate paragraph on the page is a quotation from a letter of General Donovan, it is highly desirable, if it is to be used at all, that it be made to appear that this is not something personally selected and deliberately disclosed. I would suggest that the background for it be as follows:

"Since the disclosure by the Smyth Report and by other commentaries of his originative connection with the project, he has prepared a document, which is now part of the War

*This service has been rendered by me as a public service, without remuneration.

Department's files on the early history. Of the numerous acknowledgments and tributes he has received, he cherishes in particular a recent letter from his chief in the O.S.S., General Donovan. etc., etc.

Galley 7.

7. The concluding paragraph in its present form is inadvisable because of the special role that the tables played in confidential discussions of the timing of operations, though to what extent they influenced the final decisions is not for me to say and cannot be known now that President Roosevelt is dead. I would still hold that the suggestion on page 8 of my letter to you of October 10th would be advisable, namely to utilize my observations on jazz for a concluding and light note.

If, however, you desire to utilize the material dealing with strategy, then will you consider substituting the attached contemporaneous analysis of the D-Day operations in the enclosed resubmission of my talk before the A. T. T. Economists Group on June 30, 1944. It is noteworthy that a year later the Times, on June 22, 1945, published a dispatch from its correspondent in Paris, Gladwin Hill, to the effect that General Jodl, the "brains" of the German General Staff, revealed that Berlin expected "a second blow in the Calais area and held back reserves until too late."

The fact that this impression had been sedulously fostered by the press, the radio and in Mr. Churchill's masterly reviews of the war situation and that it had come to be accepted with almost total unanimity by our people and by our Allies constitutes the greatest and most profitable propaganda feat in history.

Your own version of this could be followed by your neat and humorous concluding sentence.

A REPORTER AT LARGE

THE CONTEMPORANEOUS MEMORANDA OF DR. SACHS

ALEXANDER SACHS, mentioned in the Smyth Report on the atomic bomb as the man who got President Roosevelt interested in atomic research, in the fall of 1939, came to this country from Russia when he was eleven, received a scientific degree at Columbia when he was nineteen, and when he was twenty went to work as a clerk for the Wall Street firm of Lee Higginson. A year or so later he returned to Columbia as a postgraduate student of philosophy. In 1916, when he was twenty-three, he was made a Francis Parkman Fellow in philosophy at Harvard, where later he was also made a Henry Rogers Fellow in jurisprudence and sociology. These appointments enabled him to spend a couple of years studying philosophy, jurisprudence, and sociology at Harvard, and further enabled him, when he returned to the Wall Street district, to join the Downtown Harvard Lunch Club, a group of Harvard downtown men who maintain a couple of lunch-rooms over Angelo's Restaurant on Pearl Street. Sachs has been an economic adviser to a number of important private investors, among them Walter Meyer, a brother of Eugene. In 1931, while Sachs was abroad, the late Lord Reading, then Foreign Secretary of the British Cabinet, invited him to serve as his informal economic consultant, without pay. Sachs accepted and, after he had returned to this country, proceeded to pelt Reading with long letters of economic counsel. In 1933 he was in Washington, working for the N.R.A. In 1936 he was elected a vice-president of the Lehman Corporation, an investment trust managed by Lehman Brothers, and in 1942 he resigned to become an independent economic consultant. He has been consulted by, among others, the Lehman Corporation; the War Emergency Pipelines Corporation, which during the war built the petroleum pipelines from the West to the Atlantic seaboard; and—again without pay—by the Petroleum Industry War Council, set up in 1942 at the suggestion of Harold Ickes, then Petroleum Administrator, to coordinate and oversee the war work of the oil companies. Sachs was also, during the war, an O.S.S. consultant on matters so secret that not even *Collier's* or *Life* has written them up, and he sent many hush-hush, and perhaps even hush-hush-hush, communications to General Donovan.

Sachs is fifty-two, has curls, and looks so much like Ed Wynn that when he was in Washington with the N.R.A., his colleagues would tell visitors that Ed Wynn was working there; they would then open the door to Sachs' office and permit these people from the outside world to peek in and admire this interesting bureaucratic wrinkle. Sachs likes to carry research around with him and is the possessor of forty second-hand briefcases, a birthday gift from some jocular Lehman Corporation officials. His pockets are stuffed with memoranda, which he deposits in a pile on the floor when he is looking for something, and both in writing and in conversation he uses such phrases as "if only we could overcome the scleroticism of the Right

and the infantilism of the Left," "secular Calvinism," "this Jeremiahesque observer" (Sachs), and "an instrument of divisiveness among the survived triad of hegemonous powers" (the atomic bomb). Dr. Sachs likes to embed his phrases in rather long sentences. In 1932, in a typical three-thousand-word letter, he wrote Lord Reading: "The apparent success of the monetary doctrine and the forecasting technique based thereon in dealing with the business recessions of 1923 and 1927—which, while serious on the inadequate and misleading business curves, too heavily weighted with regressive economic activities, were mere pauses in the major postwar reconstruction expansion—so strengthened the belief in the validity



"Anyhow, you're improving. This time, you're leaving under your own power."



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of this monistic monetary doctrine that businessmen came to adopt a sort of fatalistic reliance on managed Federal Reserve policies, and abdicated their qualitative thinking and practical caution for mechanical indicators and quantitative measures which, for all their elaborate sophistication, had only a tangential relation to the dynamic realities of the economic overproduction and the financial inflation. that they failed to grasp and evaluate." After a few staccato sentences of fifty or sixty words each, he went on: "It [the collective illusion about the forces underlying American post-World War I prosperity] can only be understood as a product and manifestation of the postwar culture: of the eclipse of certain attitudes and habits of rational management of affairs in the light of intellectually determined or accepted principles and ethical standards and critical judgment applied with old-fashioned logic, candor, and caution; and of the emergence and diffusion of certain attitudes and habits characterized by facile skepticism as to all principles and standards, by an exaltation of the quantitative and ignoring of the qualitative—illustrated not least in the prevailing financial and business forecasting by mere mechanical guides which proved so unperceiving and so misleading in the greatest slump in history—by the vogue of irrationalism and psychologizing and the whole technique of propaganda, regimented opinion, and super-salesmanship for 'putting it over' on the public to the point of having succeeded in putting it over on oneself."

Dr. Sachs is credited with having furnished Dorothy Thompson and Major George Fielding Eliot with a number of their ideas. They, in turn, are credited with having made Sachs comprehensible, on occasion, to the public. Sachs himself is the man who accomplished the possibly more monumental feat of making Einstein, Dr. Leo Szilard, and Professor Enrico Fermi, three men whose work on uranium fission helped in the discovery of the secret of atomic disintegration, comprehensible to President Roosevelt. In the spring of 1939, around the time the Axis seized Prague, Szilard summed up the work he and Fermi had done at Columbia on the matter in a report entitled "Instantaneous Emission of Fast Neutrons in the Interaction of Slow Neutrons with Uranium." Einstein read the Szilard report, which was printed in the April 15, 1939, number of the *Physical Review*, and he and Szilard and Sachs and Professor Eugene P. Wigner, a Prince-

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ton physicist, all of whom were friends, began to discuss the rôle an atomic bomb might have in a world apparently about to go to war. Sachs had just covered the same subject, in an interoffice communication to himself called "Notes on Imminence World War in Perspective Accrued Errors and Cultural Crisis of the Inter-War Decades," which read, in part:

There is still time for Western Civilization, and especially for the exceptionally and fortunately situated United States, to use the time-drafts that can still be made on the Bank of History, for the preparedness that has and will become more and more urgent and inevitable for all members of Western Civilization as a result of the past errors committed and in the course of the prospective unfolding aggressions of Nazi Germany.

Through sources available to Einstein, the four men knew that Germany had stopped the exportation of pitchblende—the ore that yields both radium and uranium—from Czechoslovakia to other countries and that uranium research was going on at a great pace at the Institute of Chemistry of the Kaiser Wilhelm Institute in Berlin. "I am an economist, not a scientist," Sachs has told friends, "but I had a prior relationship with the President, and Szilard and Einstein agreed I was the right person to make the relevant elaborate scientific material intelligible to Mr. Roosevelt. No scientist could sell it to him." Sachs had been on casual terms with Roosevelt ever since he had done the economic research for some of Roosevelt's speeches in the 1932 campaign.

THE following blow-by-blow account of the Roosevelt-Sachs-et-al. meetings which ensued, and which eventually produced the Manhattan District project, is the result of a recent conversation I had with Dr. Sachs in his office downtown. On October 11, 1939, visiting Roosevelt for over an hour, Sachs read to, and left with, the President three items: (1) an August 2nd letter to Roosevelt from Einstein which said, "This new phenomenon [i.e., the expected conversion of uranium into a source of energy] would also lead to the construction of bombs. . . . A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port together with some of the surrounding territory;" (2) an August 15th memo from Szilard which said, "There is no doubt that it [the destructive power of these bombs] would go far beyond all military conceptions," and urged that a quantity of pitchblende be brought to this coun-

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try from the Belgian Congo, then the major source of it, before the Germans invaded Belgium; (3) a letter to the President from his interlocutor which referred to "the construction, as an eventual probability, of bombs of hitherto unenvisioned potency and scope," and went on to say, "It is necessary to enlarge and accelerate the experimental work, which can no longer be carried out within the limited budgets of the departments of theoretical physics in our universities." In September of 1939, after the German invasion of Poland, the President and Congress were preoccupied with the revision of the Neutrality Act, and it took Sachs several weeks to arrange for this interview.

Sachs read his three documents out loud to the President because of a theory he has that busy people, especially Presidents, give anything they read almost an automatic brushoff. "People are punchdrunk with printer's ink and it's mostly mascara on the eyes," he explained to me. The October 11th White House interview was one of a considerable series, during which Sachs, according to friends, would ease the President into the discussion with a few learned jokes. I asked Dr. Sachs about this, and he entered a modest disclaimer. "I'd just tell him I'd paid for the trip to Washington and couldn't deduct it from my income tax and would he please pay attention," he said. "I once made a joke about Americans' being God's Frozen People, during the wartime freeze on everything—to which, incidentally, I was in some particulars opposed."

Roosevelt, to whom atomic research was news, reacted favorably to the October 11th talk, during which Sachs suggested that the President arrange for a continuous liaison between the scientists working on uranium, the Administration, and the War and Navy Departments. "He seemed to share the sense of urgency," Sachs says. "He was a man of quick apperception." Toward the end of this conversation, the President arranged for the liaison Sachs was asking for by calling in his aide, the late General Edwin M. Watson, and instructing him to set up an Army-Navy committee under the chairmanship of Dr. Lyman J. Briggs, Director of the National Bureau of Standards, to consider the ideas and material Sachs had presented. He also asked Sachs to stay over in Washington to confer with Briggs the next day. This conference led to a meeting, on October 21st, attended by the three members of the new government committee (the Advisory Committee on Uranium: Briggs, Colonel Keith F.



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Adams on, of the Army Ordnance Department, and Commander Gilbert C. Hoover, of the Navy Bureau of Ordnance), by Sachs, as Roosevelt's representative, and by Fermi, Szilard, Wigner, Fred L. Mobler, head of the atomic-physics section of the Bureau of Standards, and Professor E. Teller, a theoretical-physics authority at George Washington University. Einstein had also been invited, but, according to Dr. Sachs, his "health and shy disposition interposed obstacles."

At the Uranium Committee's first meeting, a number of the men were in favor of the government's leaving atomic research to the universities. Briggs, however, after outlining the world situation for the benefit of the more cloistered scientists, urged everyone, as Sachs puts it, "to engage in a mental projection from the normal course of research-development to the impact of a mere scientific possibility upon the national defense" and to "weigh differently in the new setting the risk coefficients attached to even remote possibilities." On November 1st, in a report to the President signed by Briggs, Adamson, and Hoover and entitled "Possible Use of Uranium for Submarine Power and High Destructive Bombs," the committee said that if the chain reaction which would presumably follow uranium fission "could be controlled so as to proceed gradually it might conceivably be used as a continuous source of power in submarines, thus avoiding the use of large storage batteries for under-water power," and that if the reaction "turned out to be explosive in character it would provide a possible source of bombs with a destructiveness vastly greater than anything now known." The report urged that uranium research be given financial support by the government. By February, 1940, \$6,000 of Army and Navy funds had been allotted to the research being done at Columbia. Einstein and Sachs, who kept conferring with each other, felt that this was a tiny drop in the bucket. On March 7th, by prearrangement, Einstein wrote Sachs calling attention to the intensified atomic work going on in Berlin. "I have now learned," he said, "that research there is being carried out in great secrecy and that it has been extended to another of the Kaiser Wilhelm institutes, the Institute of Physics." Sachs forwarded this letter to Roosevelt, and in a talk with the President, early in April, he read a copy of it out loud and suggested that \$100,000 be provided for preliminary work toward the setting up



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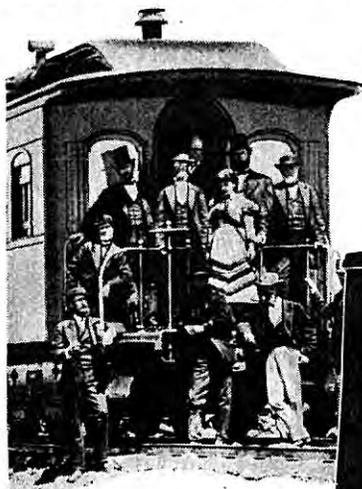
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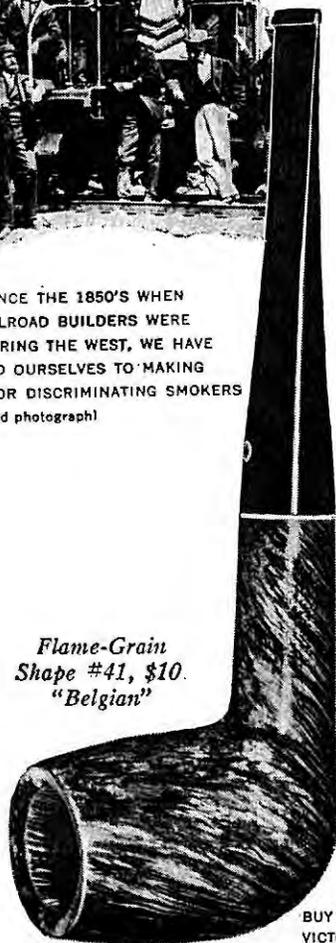
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of a large-scale experiment. Roosevelt got General Watson to call another Uranium Committee meeting. This was held on April 27th and was attended by Briggs, Fermi, Szilard, Adamson, Hoover, Wigner, Sachs, Rear Admiral Harold G. Bowen, Director of the Naval Research Laboratory, and Dr. George B. Pegram, Dean of the Graduate Faculties of Columbia. Sachs again tried to get Einstein to show up, but, he says, "it became clear that indisposition on account of a cold and the shyness which makes Dr. Einstein recoil from participating in large groups would prevent his attendance." Einstein did, however, send Dr. Briggs a letter, to be read at the meeting, which seconded a Sachs suggestion that a board of trustees be set up to head "a non-profit organization which, with the approval of the Government committee, should secure from governmental or private sources, or both, the necessary funds for carrying out the work," so that it "could be carried out much faster than through a loose coöperation of University laboratories and Government departments."

The April 27th meeting gave Dr. Sachs the feeling that the time-drafts on the Bank of History were being exhausted without our making sufficient progress. "The majority of the committee," he said the other day, "accustomed to the small scale of physical laboratories at the universities and the correspondingly reduced scales of the budgets of governmental scientific laboratories, did not appear ready to design a large-scale and comprehensive program, and instead insisted on bit-a-bit procedures with ranked preferences and time deferments."

Two weeks later, history, in the shape of the German invasion of Belgium, came to the aid of Sachs and the more urgent of his scientist colleagues. ("The situation adumbrated in the initial presentation of October 11, 1939, had come to pass" is the way Dr. Sachs says it.) On May 11th, after a discussion with Einstein, Fermi, Szilard, Pegram, and Professor Harold C. Urey of Columbia, he wrote the President that the invasion of Belgium, heightening the danger that the supply of uranium from the Belgian Congo would be cut off, had accented the pressing need of governmental atomic-research backing. Four days later Dr. Sachs recommended to General Watson the establishment of a Scientific Council of National Defense "composed of executives, engineers, and economists, acting in behalf of the Government, who should be invested with administrative powers for the testing

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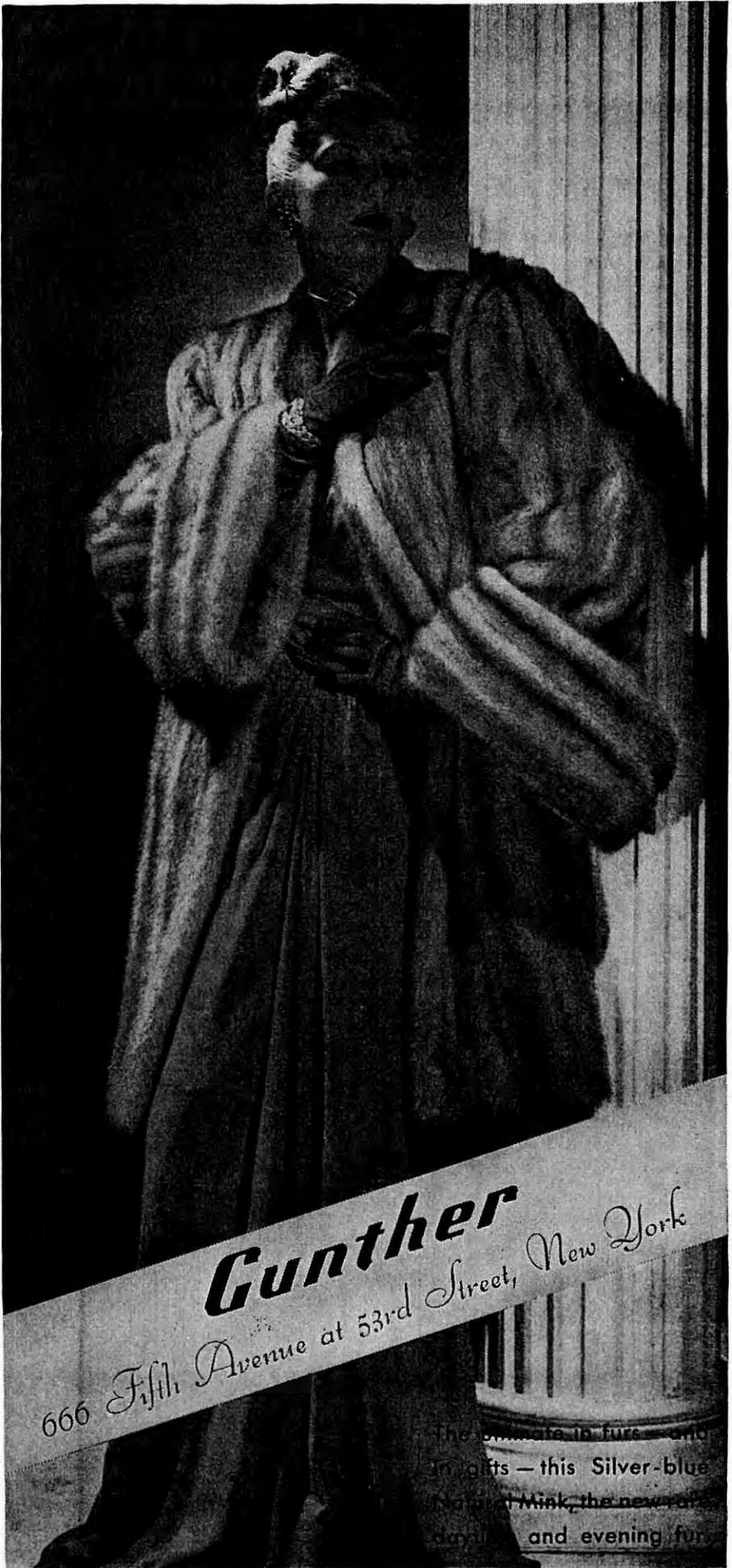
at DINNER and SUPPER

and execution of technical projects of utility for national defense." Watson assured him the President would consider the matter, and on June 15th, the day after the German Army entered Paris, Roosevelt set up the National Defense Research Committee, headed by Dr. Vannevar Bush. After Pearl Harbor, it was renamed the Office of Scientific Research and Development. The Briggs committee became a subcommittee of the Bush committee, atomic-bomb research was on its way to becoming a two-billion-dollar federal project, and Dr. Sachs happily and voluntarily faded out of the picture. "I provided for my own disappearance," he told me.

AT that point in our conversation, Dr. Sachs gave me permission to dive into a pile of memoranda on the floor. I came up with a recent letter from General Donovan. "Unclassified," he said, relieved, and handed it over. "Dear Alexander," it ran. "History deserves the full story of the Atomic Project. The nation is indebted to you for the catalytic function which you performed. 'We may our ends by our beginnings know.' How could the project have ended other than successfully when you—the deft intermediary between committee room, laboratory, and planning board—helped lay its foundations so well? Sincerely, Bill."

"My relationship to the President was that of a possible Ishmaelite," said Dr. Sachs, filing General Donovan's letter back on the floor. "My contemporaneous memoranda threw into sharp relief the decisive choice of the period—namely, between the leisurely bit-bitarian procedure of dispersed university experiments and tense and coordinated large-scale experimentation. Today the choice is in a converse direction. If the research from here on remains under the control of the Army, then the military use will come to throttle the independence and initiative which, operating through a pluralism of sources, make for those novelties and mutations in human thought that give us the great discoveries."

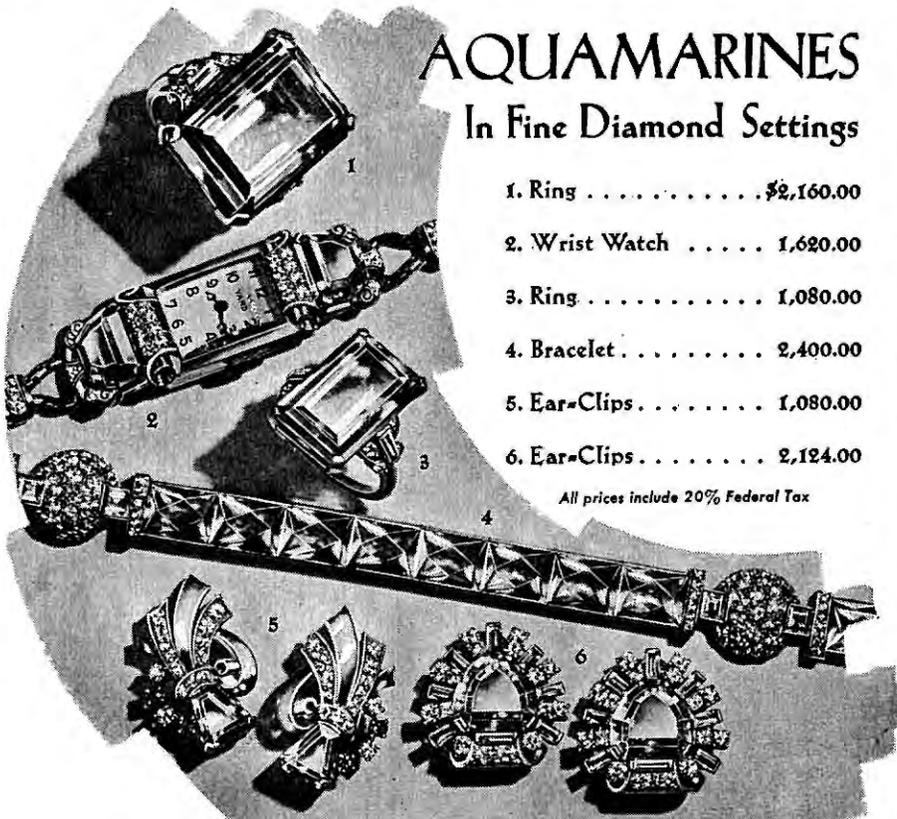
Dr. Sachs thinks that the atomic bomb should be turned over to an international police force under Chiefs of Staff of a World Security Council and further developed on an island in the Pacific as a weapon to strengthen the control of the existing world organization. He also feels that atomic energy should be made available for peaceful projects. "From the vantage point of cultural-technological history," he said,



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presumably surveying me from it, "a major source of new power enlarges the physical geography and transforms the sociographic complex along the dimension of depth. What have remained the desert areas of the world and the sterile spaces are related to the inadequacies and inaccessibilities of water and energy sources. In the light of the reflections given in certain exhibits connected with the formative stages of the atomic project, it is reasonable rather than speculative to say that new worlds will open up and that the existing world will be enriched. The areas from the Sahara to the Arctic, from the jungle to the arid, will in the course of a time that we can control be transformed by the lifting of the deep-lying water and by making accessible power and heat."

AS I was about to depart, Dr. Sachs reached into a briefcase and presented me with copies of some financial tables he worked up for President Roosevelt, including one whose title he had telescoped into "Close-up Comparison of American and British War Economies on Per Capita Basis Commensurating Per Capita Gross National Product and War Expenditures in Dollar Terms with Adjustments in Case Britain for (a) Productivity Shifts and (b) Resource Disinvestment." I wiped the mascara from my eyes and slipped out before he could start reading out loud or regale me with a learned joke.

—GEOFFREY T. HELLMAN

Lieut. Dick Williams, press agent, is back after taking parachute pictures in the Pacific. The latter's return has the showmen eagerly awaiting the next war.

—The News.

Patience, men!

I finally collected enough from storekeepers and others, most of whom I didn't even know, to buy a cow which gave me 320 pounds of good beef, 500 oranges, 300 grapefruit, 100 pounds of rice, sugar, flour, and candy for the kids.—Lewiston (Me.) Journal.

You did well.

MOST FASCINATING NEWS STORY OF THE WEEK

[The following item, reprinted in its entirety, is from the Durham (N. C.) Morning Herald]

LAWRENCE, MASS. (U.P.)—Every night for 25 years, James Tierney looked out his bedroom window as a habit just before retiring. Not once in that time did he ever notice anything unusual.



INCEPTION ATOMIC BOMB PROJECT 1939-1940.

PRESENTATION OF IDEA TO PRESIDENT ROOSEVELT

By

Doctors Albert Einstein and Alexander Sachs

August - October, 1939.

AND FOSTERING DIRECTION OF EARLY DEVELOPMENT

TO mid-1940 by Dr. Lyman J. Briggs, Head of

Bureau of Standards, Department of Commerce,

and Chairman of Presidential Committee with

Dr. Einstein, Dr. Sachs and Dr. Pegrin, as

Co-ordinating Members.

SUMMARY DOCUMENTARY HISTORY

By

Alexander Sachs

August 8, 1945.

I. Prelude to Presentation of Project to President Roosevelt.

By Spring, 1939, there was completed in the Physics Laboratories at Columbia University an advance upon the uranium researches in Europe of Doctors O. Hahn and L. Strassmann, and the supplementary research of Dr. L. Meitner and E. Frisch (the latter noted in the February, 1939, issue of "NATURE, LONDON".) This European work on the fission of uranium was independently and by different method carried out by Professor Fermi and others in the United States.

The advance made by Dr. Leo Szilard was reported under the title "Instantaneous Emission of Fast Neutrons in Inter-action of Slow Neutrons with Uranium" and was published April 15, 1939, issue of "THE PHYSICAL REVIEW" (manuscript from Columbia University Physics Laboratory was dated March 16, 1939).

The cumulative researches of Dr. E. Fermi and L. Szilard which had been communicated in manuscript to Dr. Einstein led him in conferences first with L. Szilard and then with Alexander Sachs to develop jointly the implications of the imminent discoveries for the world situation, on the assumption that Germany would go to war. It so happened that in memorandum of last mentioned, Alexander Sachs, economist, had just prior to the Nazi seizure of Prague and Czechoslovakia placed as is evident from the title "The Imminence of World War in Perspective, Accrued Errors and Cultural Crisis of the Inter-war Decades." ; (Exhibit No. 1, dated March 10, 1939, "~~Notes on Imminence of World War~~" "Notes on Imminence of World War in Perspective, Accrued Errors and Cultural Crisis of the Inter-war Decades". The author of that memorandum was then at the time sensitive to the concern over the need of what he called in the concluding sentence "the preparedness that will become inevitable because of the consequences of the accumulated errors of the victors of the last war and the prospectively unfolding aggressions of Nazi Germany!" The further developments of the period that had come to the attention of Dr. Einstein was that subsequent to the seizure of Prague in mid March, 1939, Germany stopped the sale of uranium from the Czechoslovakian mines. This was related by Dr. Einstein to the dual fact that the recent work on uranium carried on outside of Germany by predominately refugee scientists was being watched and repeated by German scientists at the Kaiser-Wilhelm-Institut in Berlin and that a son of the German Under-secretary of State, von Weissacker, has been attached to the Institut.

While among the physicists there were doubts entertained by the further developments, Dr. Einstein accepted the possibility that the nuclear chain reaction could be set up in a mass of uranium by which vast amounts of power would be generated; and then carried the new phenomenon a stage further to the eventuality that extremely powerful bombs of a new type could be thereby constructed; "a single bomb of this type carried by boat and exploded in a port might very well destroy the whole port together with some of the surrounding territory"

In view of the foregoing developments and concern for the world in the event of and on the assumption of German aggressions on the peace of the world, it was agreed, by Dr. Einstein and his colleagues, that the situation and its implications should be brought to the attention of the president.

Though the experimentalists were uncertain whether a fast neutron reaction could be made to work, the far-reaching military consequences from such a possibility were such that here on it was deemed essential that the researches

in England, France and the United States be somehow kept from Nazi Germany, and indeed a proposal to the effect for the withholding of the publication on chain reaction was already submitted ~~to the President~~ and while it was received with favor by the Western scientists, the proposal was looked at askance in France. Finally, since the largest supply of good ore was in the Belgian Congo and as new phases of the experiment could not be carried out within the limited budget of universities, it was deemed by this group that the aid of the government was, even from an economic standpoint, necessary, if only to indicate to public spirited private persons and corporations that the ensuing research would be invested with a special national significance.

In view of all these considerations of development, it was finally agreed that to be effective the presentation to the president must be direct and under conditions that would permit the spelling out of the cumulative implications and consequences for the nation; and this task was entrusted to the economist and political-scientist member of the group by reason of his long association with the President as a informal advisor and friend.

Upon the completion of the of the letter of Dr. Einstein to President Roosevelt dated August 2nd and the supplementary memorandum by Doctor Szilard dated August 15th, 1939, came the German demands upon Poland and the invasion of Poland on September 1st, culminating with the fall of Warsaw on the 27th, the attendant and ensuing presidential concern with guiding through Congress a revision of the Neutrality Act served to delay the arrangement of a meeting for the writer with the president. Only after the first week of September was it possible to arrange an interview with the president and conference with his aides delegated for the consideration of the problem and the proposals.

II.

Conference at the White House on October 11, 1939, and the appointment of a committee headed by Dr. Lyman J. Briggs, Director of the Bureau of Standards to pass upon the project.

1. At the conference with the president at the White House on October 11th writer presented a review of the following collect of materials:

- (a) Dr. Einstein's letter of August 2, 1939 (marked herein as Ex. 2a)
- (b) Memorandum of Dr. Szilard of August 15, 1939 (marked herein as Ex. 2b)
- (c) copies of articles that have appeared in scientific journals (of which only the report of Dr. Szilard's communication to THE PHYSICAL REVIEW dated April 15, 1939, is herewith enclosed marked Ex. 2c)

~~Writer orally presented to the president a memorandum letter dated October 11, 1939~~
~~and enclosed for the president's consideration~~

On behalf of Dr. Einstein and himself the writer orally ~~and~~ in the course of the conference and in his covering memorandum letter of October 11, 1939 (marked herein as Ex. 3) made the following requests:-

- (a) liaison at the White House
- (b) committee of the services as a liaison between Army and Navy
- (c) with war having broken out and submarine operations begun, the securing of material from the Belgian Congo

In keeping with the theory already cited in writer's memorandum of March 10, 1939, (Ex. 1) ~~and~~ writer's memorandum to the president of October 11, 1939, pointed to the danger of German invasion of Belgium and hence the ~~possibility of~~ advisability of taking steps then through diplomatic channels for the diversion of the Belgian uranium to the United States. In respect to the financial requirements of the project, it was suggested that, ~~if~~ assuming recognition by the government of the national significance of the research, funds could be secured either from ~~public spirited executives in chemical and electric companies or from foundations~~

2. In the wake of this conference the president asked his secretary and military aide, General ~~Wat~~ Edwin M. Watson, to act as a liaison ~~of~~ for the White House. General Watson was further asked by the president to effect an introduction to Dr. Lyman J. Briggs and to constitute in the president's behalf a committee of Dr. Briggs, Colonel Adamson of the Army and Commander Hoover of the Navy for the consideration of the ideas and material that had been submitted to him by Dr. Einstein and the writer. President further suggested that the writer stay over the following day for a conference with this newly appointed committee.

The conference on October 12th with Dr. Briggs led to the arrangement of a meeting for the end of the month between the government group and those concerned with this problem. (In addition to the formal invitations sent by Dr. Briggs the writer was asked to send an explanatory note to Professor Wigner, of Princeton, and Professor ~~Edward Teller~~ Teller of George Washington University, (copy of which is included under the designation of Ex. 4). ~~The meeting held at the office~~

~~at the Bureau of Standards on Saturday morning, October 21, 1939, at 9:30~~

With the exception of Dr. Einstein, whose health did not permit attendance at that or subsequent meetings, all those invited participated as follows at the meeting held in the office of Bureau of Standards on Saturday morning, October 21, 1939, at 9:30.

- (a) For the government - L. J. Briggs
Colonel Adamson
Commander Hoover
- (b) As Presidential representative - Alexander Sachs
- (c) As cooperating scientists - Professor Albert Einstein (who was unable to attend on account of health).
E. P. Wigner - (Professor Theoretical Physics at Princeton)
E. Teller (Professor, George Washington University)
E. E. Fermi (Professor, Columbia University)
L. Sallard (visiting experimental physicists at Columbia and Trustee of the Association of Scientific Collaboration)

In the course of the technical discussion at the meeting on October 21st objections were raised by some that those interested in the political-military implications were much too previous in pre-supposing that what was merely possible would become actual and so they urged that it was necessary for the government to concern itself at this time with the scope and pace of the research being carried on under the normal auspices of our educational institutions. Dr. Lyman Briggs in his official position as the Director of the Bureau of Standards and as presidential appointee ~~as~~ as chairman of the combined group observed that national considerations justified the mental extension of the ~~fe~~ available possibilities with a view to arriving at an estimation of the national interest in facilitating and accelerating the course of development; it was on the note that the governmental part of the group would thus approach the problem sympathetically that the conference ended.

3. The inter-departmental committee appointed by the President submitted on November 1, 1939, a preliminary report of ~~this~~ its findings and recommendations with regard to the subject that had been set by the President: POSSIBLE USE OF URANIUM FOR SUBMARINE POWER AND HIGH DESTRUCTIVE BOMBS". The report of the committee - L. J. Briggs, chairman, Keith Adamson, Lt. Colonel U S A and Gilbert C. Hoover, Commander U S N - opened with a reference to the meetings of the committee "with ~~the~~ Dr. Alexander Sachs and the physicists from Columbia, Princeton and other institutions", and described the recent work, and set forth the possible applications to submarine power and explosives inherent in the possible successful release of accumulated atom splitting in the form of a general reaction. Because of the historic interest of this formulation by the governmental committee of the projected developments, it is desirable to present the full text of the main findings.

- (1) Discoveries made within the last year have shown that when a uranium atom is bombarded by neutrons (uncharged elemental particles of matter) from an outside source, the uranium atom may be split in two and this breakdown is accompanied by the release of a great amount of atomic energy.
- (2) When the uranium atom is split it likewise sets neutrons free. These neutrons may be able in turn to split other uranium atoms and thus continue the process as a chain reaction. This continuous splitting has not so far been accomplished. The proposed research would be directed to finding a way to do it.
- (3) The energy released by the splitting of a mass of uranium atoms would develop a great amount of heat. If the chain reaction could be controlled so as to proceed gradually it might conceivably be used as a continuous source of power in submarines, thus avoiding the use of large storage ~~with~~ batteries for under-water power.
- (4) If the reaction turned out to be explosive in character it would provide a possible source of bombs with a destructiveness vastly greater than anything now known.

While deeming that such a general reaction has not yet been demonstrated, the committee next gave as its major conclusion the following:-

) copy 5 para. when material received from Commerce)

In furtherance of that he proposed that initial support - funds for which committee expected to secure from the enactment of the Lea Bill - be given to -

- (a) supplying for immediate experimental work 4 metric tons of pure-grade graphite, and
- (b) if later justified, supplying 50 tons of uranium oxide.

Finally it recommended under the concluding paragraph 8 - by letter of Dr. Briggs to the President of November 1, 1939 - that the committee be enlarged for the support and coordination of these investigations in different universities, and that the following be invited to constitute a coordinating group:-

President Karl Compton, Massachusetts Institute of Technology
Cambridge, Massachusetts
Dr. Alexander Sachs - One William Street, New York
Professor Albert Einstein, Princeton University, Princeton, N.J.
Dean George B. Pogram, *Columbia*

III of 3.

Then an interlude of activity ensued, approximately coincidental with the then denominated phoney war between the fall of Poland and the invasion of Norway. The President was preoccupied with numerous internal and international problems. General Watson, as liaison, felt that the report of November 1st was not sufficiently pointed, and accordingly in transmitting its text to the writer on February 8, 1940, - having previously conveyed merely its general tenor - stated that he was asking "for a special recommendation from Dr. Briggs".

Meanwhile, progress was concentrated in the organization and the functioning of the coordinating committee mentioned in the conclusion of point 8 of Dr. Briggs' report to the President of November 1, 1939. Conferences were had between the groups at Columbia University - consisting of Drs. Pegrarn, Fermi and Szilard - with the writer as presidential advisor and intermediary. In mid-November an octet of experimental projects was projected at C by the Columbia group with a view to securing a number of subsidiary questions, in the hope that these could be vigorously pursued so that reports could be made within a period of six months. Based on notes made at the time, the definition and scope of the subsidiary questions and the recommended personnel from nearby educational institutions as projected were as follows:-

1. Slow Neutron Reactions
Fermi, Pegrarn, Szilard (all Columbia) Wheeler (Princeton)
2. Fast Neutron Reactions
Fermi, Szilard Tuve (Carnegie Institute) Wigner (Princeton)
3. The Question which of the Uranium Isotopes splits:
Dunning (Columbia) Fermi, Tuve, Wheeler.
4. Small Scale Separation of Isotopes by any Method except Diffusion:
Beams (Univ. Virginia) Fermi, Tuve.
5. Small Scale Separation of Isotopes by Diffusion:
Fermi, Furry (Harvard) Urey (Columbia)
6. Theoretical Possibility and Limitation of Large Scale Separation by Centrifuging:
Beams, Pegrarn, Szilard, Teller (George Washington Univ.)
7. Theoretical Possibility and Limitation of Large Scale Separation by Diffusion:
Fermi, Furry, Onsager (Yale) Urey.
8. Possibility of Large Scale Production of Uranium Metals:
Pegrarn, Szilard, and somebody from the Department for Chemical Engineering of MIT or Columbia.

In particular, the projects at Columbia came to receive limited aid for the purchase ~~amount~~ of materials, as is evident from the reply of February 20th, by the Director Lyman H. Briggs to General Watson's memorandum of February 8, 1940 (this exchange of correspondence being marked respectively Ex. 6A and 6B).

The writer as co-initiator with Dr. Einstein, of the original project conferred with Dr. Einstein in February at Princeton and learned of his judgment that the work progressing at Columbia was ~~much~~ more significant than that at Paris, as reported in "SCIENCE". Hence in anticipation of Dr. Briggs' reply to General Watson - (Ex. 6B) - a letter was written to General Watson under date of February 15 pleading for larger and more interested aid and promising an evaluation in the near future from Dr. Einstein of the work being completed at Columbia (marked Ex.6C)

Early the following month Dr. Einstein upon submission of his view to the President wrote me under date of March 7, 1940, from Princeton, reviewing the development since the conferences I had arranged in Washington in October between the scientists engaged in the uranium research and the governmental committee appointed by the President. (A copy of Dr. Einstein's letter to me - original having been later forwarded to the President - submitted herewith as Ex. 7a) The letter referred to the intensification of interest in uranium in Germany, judging by the German government's taking over of both the chemical and the physics institutes and the placement of the research under the leadership of C. F. von Weizsaecker in substitution for the retired director. A week later the writer sent to the President Dr. Einstein's review and asked for an opportunity to confer on the latest phase of the experimental work (marked Ex. 7b) ~~At the turn of April at a conference in the White House at which the writer unfolded some views on the probable course of the German aggression in the course of the Spring and summer campaigns for the mastery of the coast opposite England from Norway through France, the uranium project was once more pressed and the writer urged that a liberal fund be made available as distinguished from the delimited reimbursement fund for material purchases as under Dr. Briggs' procedure. Indeed the late Spring months must be utilized to preempt academic talents for research as distinguished from seasonal appointments for teaching.~~

At the end of the month a note was received from General Watson under date of March 27, 1940, to the effect that the work was proceeding satisfactorily and that "the matter should rest in abeyance until we get the report" (marked herein Ex. 7c), but a sense of foreboding with respect to Nazi aggression that characterized the writer the previous year (as was voiced in the memorandum of March 10, 1939, No. 1) impelled the writer to the conviction that what was called at the time the phoney war was bound to be replaced by unrelenting waves of unresisted Nazi aggression through Western Europe. At the turn of April at a conference in the White House at which the writer unfolded some views on the probable course of the German aggression in the course of the Spring and summer ~~campaign~~ campaigns for the mastery of the coast opposite England from Norway through France, the uranium project was once more pressed and the writer urged that a liberal fund be made available as distinguished from the delimited reimbursements fund for material purchases as under Dr. Briggs' procedure. Indeed the late Spring months must be utilized to preempt academic talents for research as distinguished from seasonal appointments for teaching. (The statements and recommendations then made were embodied in an aide-memoir which was prepared at Washington and left at the White House and a copy is presented herewith as Exhibit 7c)

Then harkening back to the previous correspondence, letter of March 15th (Ex. 7b) the President advised the writer under date of April 5, 1940, that he had asked General Watson "to arrange another meeting in Washington at a time convenient for you and Dr. Einstein". He concluded with his reaffirmation that "I shall always be interested in these results." (marked Ex. 8a) Under even date General Watson asked the writer for a list of scientists to be invited and for the writer's solicitation of Dr. Einstein's suggestions - this letter being included herein as Ex. 8b) In furtherance of General Watson's request writer had inquiries made of Dr. Einstein and a composite list was submitted to General Watson of those to be present at the next meeting with the governmental authorities (communication to General Watson by writer of April 19, 1940, being included as Ex. 8c)

In his capacity as coordinator of the governmental group and the research group writer sought to secure the attendance of Dr. Einstein in the conference that was proposed by the president on April 5th. According the writer advised Dr. Einstein under date of April 15th of the developments since March and expressed the hope that Dr. Einstein would be able to attend in person and also voiced the desire to have a preliminary conference at Princeton, prior to the meeting. (letter of A.S. to Dr. Einstein dated April 15, 1940, included herein as Exhibit 10), but an indisposition from a cold and a characteristic shyness prevented Dr. Einstein's attendance. Instead writer after a conference was able to bring to Dr. Briggs an amplification of the position that had been taken by him in a communication to me of March 7, 1940 (already referred to and described as Ex. 7a) This communication which was a product of a conversation the writer had with Dr. Einstein at Princeton, emphasized the need for the establishment by the government of a committee that would have the flexibility of the conduct of research by modern technical industry,, yet considering its purpose would be detached from economic implications of a profit notice.

It was suggested by writer and concurred in by Dr. Einstein that the appropriate vehicle would be a non-profit corporation with a mixed board of trustees formed of governmental officials and public-spirited citizens drawn from from the executive side of our universities and from the executive side of socially significant corporate life. The Board of Trustees of the proposed corporation would have charge of the allocation of the financial resources and the general administration. of the corporation and a joint supervision over the scientific work. It was further suggested by writer that it should be left to an advisory scientific board selected by Dr. Briggs.

The conference was held on April 27, 1940, at the Bureau of Standards under the chairmanship of Dr. Briggs. At this conference there was considerable discussion as to the matter of expenditure that would be required. At the instance of the writer and with ~~his~~ collaboration of Dr. Snilared prepared a memorandum for him that was placed in the record, describing two types of chain reaction. It is noteworthy that the second type - in which neutrons were not slowed down - was described under PART II as holding the promise "to bring about explosions of extraordinary intensity;"

"If for purposes of aggression ((or attack)) a bomb based on such a chain reaction was set off at sea near a port, the tidal waves brought about by the explosions might lead to the destruction of the coastal cities."
(included herein as Ex.9).

While the author indicated in the memorandum and in his oral presentation at the meeting that such a bomb required for its transportation larger and more powerful airplanes than the existing ones, it was voiced by the present writer as a student of technology and strategy that we must regard ~~such~~ technology of our weapons as in an incipient stage of development and that the resistance to Nazi aggression that the Western civilization has just embarked upon may be relied upon to solve this problem of transportation just as we are trying to solve the problem of harnessing the energy from atomic disintegration to offset or even to anticipate corresponding experiments being carried on in Germany.

It was still the view of the governmental group that the scale of operations remained the same as it had been under the auspices of university experimental projects and that the funds be held down to specific needs for material at the various experimental centers instead of according advance assurance to each center that it could go forward with a larger staff and on an accelerated basis for telescoping within a short compass of time the answers to its sector of the total problems.

Revised Transcript

BACKGROUND AND EARLY HISTORY
ATOMIC BOMB PROJECT IN RELATION
TO PRESIDENT ROOSEVELT

**OPENING TESTIMONY
BY ALEXANDER SACHS**

IN HEARINGS BEFORE THE SPECIAL
COMMITTEE ON ATOMIC ENERGY
UNITED STATES SENATE

SEVENTY-NINTH CONGRESS
FIRST SESSION

PURSUANT TO

S. RES. 179

NOVEMBER 27, 1945

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menacing march of events swept aside the half-willed and half-thought schemes, and even attacked improvised defenses that were resorted to too late, as in the German case to save Germany for democracy. The outstanding feature of this great depression is that the economic order developed since the Reformation and the great society developed since the fall of the Roman Empire have come to be threatened not by the destructive impact of external or natural forces, but by a disintegration from within because of an incipient failure of concerted will and political wisdom."

Thus imbued, I came to suggest early in 1933 in connection with the formulation of the National Recovery Act—for which I was called in in my capacity as an economist—that an important use for public-works funds to be provided was the reconditioning of the Navy, the mechanization of the Army, and the improvement of national defense. General Hugh Johnson, who during the depression was an assistant in an economic capacity to Mr. Baruch and had thus become interested in my interpretations and forecasts of economic developments, was given by the President a leading role in the NRA and he and the President asked me to serve as organizer and first head of NRA's Division of Economic Research. In the drafting phase of the act, I at first urged upon them the inclusion of those national defense provisions.

Senator AUSTIN. What year was that?

Dr. SACHS. That was in 1933, in the legislation of April and May. Hugh Johnson in the Blue Eagle, pages 197-198, credits me with having suggested that this provision about making available funds for naval construction and other defense be written into the NRA bill. Hugh Johnson was a little bit too generous in thinking that I had sole responsibility for the idea. The fact was that in a patient argument with the President the conclusion was reached that the advent of Hitler to power boded ill for all democracies, and that it was necessary that we take time by the forelock.

I have always been of the view that the real warmongering, combined with defeatism, is done by the pacifists, and that one who is concerned about the protection of national interests without aggressive aims is the real practical pursuer of peace.

Later on—and I had been in the habit of reporting to the President regarding the progress of international developments—in 1936 he called me in to help in working out a solution for the problem of public utilities and electric power. I had proposed the idea of a power pool, and even then we discussed that in the event of war danger we would want to have a mechanism for the coordination of private and public power. The distinguished figures representing the public at that White House Conference in September 1936 were Mr. Owen D. Young and Mr. Lamont, and I had been another one that was selected alongside those representing the public-utility interests and the governmental authorities concerned with power. The international situation was a subject of discussion a year later with the renewed outbreak of Japanese aggression on China.

After Munich I had begun to send the President a series of memoranda. It was at the turn of the year in January 1939, that I had sent in a very long study on the international situation. In the preface to it I described the attitude underlying that memorandum and the predecessors on problems that had been discussed with him in 1936, and also in 1937 prior to the quarantine speech. My role was, if you will, to be a resonator for ideas that he had and also as a humble submitter of ideas of my own. In that preface I wrote:

"The orientation towards the world crisis that has been developed in prior reports and needs to be borne in mind continually is that we are already in what Thomas Hobbes, who lived through the British civil war 300 years ago, justly called 'war time tract' and 'war weather.' For war consisteth not in battle only but in a tract of time wherein the will to contend by hattle is sufficiently known * * *. For as the nature of foul weather lieth not in a shower of rain but in an inclination thereto of many days together; so the nature of war consisteth not in actual fighting but in the known disposition thereto during all the time there is no assurance to the contrary.'"

The thesis then was that the aggressor powers, the Nazis and their allies as well, for Japan had begun its aggressions in 1931 and expanded them in 1937, were passing from the state of "white war" and limited war to totalitarian war.

On March 10, 1939, when I had been asked by St. John's College to deliver a talk on the world situation, I prepared certain notes of which I had sent the President a copy. Those were entitled "Notes on Imminence World War in

Perspective Accrued Errors and Cultural Crisis of the Inter-War Decades." That memorandum dated March 10, 1939, had this opening sentence:

"This interwar generation has been living on the edge of a smoldering volcano; and the predominant attitudes among both what is called the 'right' and what is called the 'left' have been variants of escapism, very much like peasants situated on the edge of a volcano who go on cultivating the slopes in the hope that the eruptions will not take place in their lifetime."

Then I reviewed the errors of the interwar period. Toward the end I said:

"The present period is too late for that reversal of error which prevents the consequences of error. The real 'Munich' took place in 1936, in connection with the Rhineland. Then was the last opportunity missed for preventing that cumulative German aggression that was bound to culminate in a new and more terrible war by Germany. But what can and must be done for our salvation and safety is self-clarification and self-reorientation toward the onrushing dangers."

Then in the concluding sentence—and you must pardon the length, for I thought it was my business to try to think things out instead of trying to be popular—I urged preparedness:

"There is still time for western civilization, and especially for the exceptionally and fortunately situated United States, to use the time drafts that can still be made on the 'Bank of History' for the preparedness that has and will become more and more urgent and inevitable for all members of western civilization as a result of the past errors committed and in the course of the prospective unfolding aggressions of Nazi Germany."

It was in the following month, on April 15, 1939, that there was published in the Physical Review a note by Dr. Leo Szilard entitled "Instantaneous Emission of Fast Neutrons in the Interaction of Slow Neutrons with Uranium."

In keeping with the custom in scientific research, the date of its original sending was included, dated March 16, 1939. So it coincided with the time when Hitler seized Prague, and by seizing Prague became the controller of the crossways of the Continent.

The background of that article in the Physical Review was that at the turn of the year 1938 certain experiments had been concluded in Germany. These became known rather fully, thanks to Dr. Niels Bohr, of Denmark, who came to this country and reviewed them with his colleagues, for scientists are an international community. The word "international" in that connection is not as precise as it ought to be. Science rather is "trans-national"—moving across boundaries of nations—and progresses in terms of evolving common ideas. After all, our heritages of common moral, political, and intellectual ideas in their institutional forms date for our world from the Reformation and the Renaissance. That crystallization of Hebraic-Christian ideals, and that recovery of the Hellenic pursuit of science has functioned as a sort of spiritual and intellectual atmosphere for all nations of our civilization. The men of science depend upon the free flow of knowledge and ideas through that atmosphere. Through such personal communication as was provided by Dr. Bohr the refugee scientists working in this country were made aware more thoroughly than through the publications of the experiments by Drs. Hahn, Strassmann, and Meitner that had resulted in the fission of uranium.

What was subsequently done in this country represented a distinct advance. The work was by Dr. Szilard and, as independent confirmation, by Prof. Enrico Fermi, a Nobel Prize physicist from Italy. The Nazi contamination had advanced so far that return became difficult for him, as well as for all others who did not conform to the tribalistic notions of nazism. The mutual confirmatory work of Dr. Szilard and Dr. Fermi amounted to the suggestion that a chain reaction could be established in the process of atomic fission. Such a chain reaction had implications for war by reason of the kind of power that would be concentrated in and released by the process of atomic disintegration.

Because I had been imbued with the ideas already noted about the nature of the world crisis, I was concerned with what was happening to the victims of nazism and fascism, and I tried in my own small way to be helpful during the period when the scientists had to leave.

I gave you at first some high lights of the "Book of Genesis" of my concern, and after that came, if you will, the "Book of Exodus," the exodus of scientists who came to this country as a haven of refuge. Prior to that Dr. Szilard had worked in England at Oxford and Cambridge—at Oxford with F. A. Lindemann,

who played toward Mr. Churchill a role analogous to the one concerning this project played by me toward Mr. Roosevelt.

In the wake of this phase of the exodus, the scientists settled in democratic countries like ours were concerned not only with the progression of a technical problem, but with its political and moral implications. Dr. Einstein was pre-eminent among them. Professor Einstein's theoretical work, while it antedated the First World War, received practical confirmation in the astronomical tests that, interestingly enough, came just in the closing phase of World War I, as Prof. A. S. Eddington, of Cambridge, showed in his early books on relativity and space, time and gravitation. There was another great physicist, who was a friend of Dr. Szilard and part of that group, Prof. E. P. Wigner, professor of theoretical physics at Princeton.

Einstein, Wigner, and Szilard discussed the problem. I want to impress upon you gentlemen—if a member of the cognate older faith may refer to the Gospel of St. John—that “in the beginning was the word,” and the idea. In the beginning was a moral idea and a political concern on the part of the physical scientists and this social scientist whom they brought in. They brought me in because they had known of my interests and had heard that I was in a position to talk to the President and talk to him in terms of broad and fundamental concepts. The idea was, How can this be brought to the attention of the President?

The Germans were organized to carry on experimentation without limit. The Nazis were not at all concerned about the magnitude of expenditures. Ironically, despite all the beblinkered concern on the part of members of my own expertise, economics, as to the postwar problem of reparations, the fact was Germany was spending on armament in any and every year once it got going, more than was involved in the total amount of its remittances on reparations. Money was no object. They had the scientific governmental institutions. Many of the scientists who later led here and in England in this work had been carrying on such work at the Kaiser Wilhelm Institutes of Physics and Chemistry.

Our idea was that if they should be able to discover a concentrated power that could be used as an explosive, then the real safety of the United States and the rest of civilization would be gravely imperiled. For bear in mind that the essence of this period of foul weather internationally, to use Thomas Hobbes' expression for this wartime weather, was that the Nazis were rushing to conquer and not permitting others time for the organization of defense.

Therefore, these physical scientists and myself—I was brought into the picture in the summer of 1939 and was conditioned for what was taking place because I had for a long time been interested in theoretical physics and had followed the scientific publications—then felt that it was important to bring these matters to the attention of the President. In turn I felt that it was essential that an opinion should be written by the one man whom the world recognized as the preeminent scientist of our day, and not only the preeminent scientist, but, as the Senator this morning remarked, one of the greatest humanitarians because he had left nazism before expulsion orders were given to him. He had anticipated the trend of events. He did have the political foresight and did see what it implied. So after discussion Dr. Einstein wrote a letter regarding this, dated August 2, 1939. I had also asked Dr. Szilard to write a memorandum describing the significance of the current and evolving scientific research, which was written on August 15, 1939.

Then I sought and waited for a proper opportunity to see the President. I had been in touch with him through the summer, but I felt at the time that the mere delivery of memoranda was insufficient. Our system is such that national public figures—you gentlemen know it from your work as legislators, and it applies to the executive and the administrative in government—are, so to speak, punch-drunk with printer's ink. So I thought there was no point in transmitting material which would be passed on to someone lower down. This was a matter that the Commander in Chief and the head of the Nation had to know and act on. I could do it only if I could see him for a long stretch and read and discuss the material, so that it would come in by way of the ear and not as a sort of mascara on the eye.

Then, of course, with the outbreak of the war on September 1, 1939, the President had the problem of the existing neutrality legislation, as you recall. So only when that was solved did I accept an appointment, because it meant that then I could see him at leisure and present all the relevant material. I brought over the material to him, and met with him on October 11, 1939. I wrote the letter in anticipation of my seeing him so that I would be able to read it. The opening sentence was:

“With approaching fulfillment of your plans in connection with revision of the Neutrality Act, I trust that you may now be able to accord me the opportunity to present a communication from Dr. Albert Einstein to you, and other relevant material bearing on experimental work by physicists with far-reaching significance for national defense.

“Briefly, the experimentation that has been going on for half a dozen years on atomic disintegration has culminated this year (a) in the discovery by Dr. Leo Szilard and Professor Fermi that the element uranium could be split by neutrons and (b) in the opening up of the probability of chain reactions—that is, that in this nuclear process uranium itself may emit neutrons. This new development in physics holds out the following prospects:

“1. The creation of a new source of energy which might be utilized for purposes of power production.

“2. The liberation from such chain reaction of new radioactive elements, so that tons rather than grams of radium could be made available in the medical field.

“3. The construction, as an eventual probability, of bombs of hitherto unenvisioned potency and scope: As Dr. Einstein observes, in the letter which I will leave with you, ‘a single bomb of this type carried by boat and exploded in a port might well destroy the whole port together with some of the surrounding territory.’

“In connection, then, with the practical importance of this work—for power, healing, and national defense purposes—it needs to be borne in mind that our supplies of uranium are limited and poor in quality as compared with the large sources of excellent uranium in the Belgian Congo, and, next in line, Canada and former Czechoslovakia. * * *

I also informed him we had learned that in the wake of the successful experiments of Drs. Hahn, Strassmann, and Meitner, the last of whom afterward also joined the exodus, the Germans upon capturing Czechoslovakia and seizing Prague, had embargoed the export of uranium from Czechoslovakia.

I also mentioned the people who had been at work on this and who had been consulted.

“* * * Mindful of the implications of all this for democracy and civilization in the historic struggle against the totalitarianism that has exploited the inventions of the free human spirit, Dr. Szilard, in consultation with Prof. E. P. Wigner, head of the physics department at Princeton; and Prof. E. Teller, of George Washington University; sought to aid this work in the United States through the formation of an association for scientific collaboration, to intensify the cooperation of physicists in the democratic countries—such as Professor Joliot in Paris, Professor Lindemann, of Oxford, and Dr. Dirac, of Cambridge—and to withhold publication of the progress in the work on chain reactions.”

The CHAIRMAN. Doctor, what was the date of the embargo on uranium?

Dr. SACHS. Right in April, right after the seizure of Prague on March 15, 1939.

Bear in mind that the scientific world community was already astir and included Professor Joliot, married to a daughter of Madame Curie; Professor Lindemann, of Oxford, afterward Lord Charwell, who played this corresponding role to Winston Churchill.

“As the international crisis developed this summer, these refugee scholars and the rest of us in consultation with them unaniously agreed that it was their duty as well as desire to apprise you at the earliest moment of their work and to enlist your cooperation. * * *

“In the light of the foregoing, I desire to be able to convey in person, in behalf of these refugee scholars, a sense of their eagerness to serve the Nation that has afforded them hospitality, and to present Dr. Einstein's letter, together with a memorandum which Dr. Szilard prepared after some discussion with me and copies of some of the articles that have appeared in scientific journals. In addition, I would request in their behalf a conference with you in order to lay down the lines of policy with respect to the Belgian source of supply and to arrange for a continuous liaison with the administration and the Army and Navy Departments, as well as to solve the immediate problems of necessary materials and funds.”

There are two more documents that are pertinent to the enlistment of the President's interest at the time. One of the things that I submitted to the President, in addition to the scientific material was, of course, this review of mine of the whole world situation on the imminence of war and the nature of this war, which is really a Thirty Years War from 1914 on, with only a brief interlude, a brief armistice, in the twenties. From 1931 on there was a resumption

of war first by Japan in the seizure of Manchuria, and then came the succession of wars, the Italian war against Abyssinia, the interventionism by the Axis Powers in Spain, the war against Austria, and finally the seizure of Czechoslovakia.

In 1936 there were lectures delivered on the history of science, reviewing the progress since the turn of the century in the physical sciences. The book was published by Cambridge University Press after Munich in 1938. Due to the work that I had done in England and my relationship to leading figures, I used to get publications in a variety of fields, including science. This book published in 1938 contained two lectures on the history of recent developments in physics, and the development of the theory of atomic structure by Lord Rutherford, whose work initiated the technical side of the physical research since the turn of the century. Some of the greatest work of Lord Rutherford was done right nearby when he was professor of physics at McGill University, and it was for this work that he got the Nobel Prize.

There were two lectures by the subsequently deceased Lord Rutherford which were revised by an assistant of his, and then there was a separate lecture in addition on Forty Years of Atomic Theory, by F. W. Aston, of Cambridge, who died only a few days ago, as you may have seen the notice. F. W. Aston, reviewing the work that had been done by 1936 and describing what was being done in England and elsewhere, ended up his lecture with a warning and a prophecy. I showed this book to the President with a view to high lighting that, as with other fruits of the tree of knowledge, there is an ambivalence to atomic power with poles of good and evil. The concluding paragraph is as follows:

"There are those about us who say that such research should be stopped by law, alleging that man's destructive powers are already large enough. So, no doubt, the more elderly and ape-like of our prehistoric ancestors objected to the innovation of cooked food and pointed out the grave dangers attending the use of the newly discovered agency, fire. Personally, I think there is no doubt that subatomic energy is available all around us, and that one day man will release and control its almost infinite power. We cannot prevent him from doing so and can only hope that he will not use it exclusively in blowing up his next door neighbor."

The President remarked, "Alex, what you are after is to see that the Nazis don't blow us up." I said, "Precisely." He then called in General Watson, lovable "Pa" Watson, another one of that period who has gone from us, and said, "This requires action." General Watson then went out with me, and the informal group was established.

Senator VANDENBERG. What was the date of this?

Dr. SACHS. October 11, 1939, sir.

He selected, with the approval of the President, one man representing the Army concerned with science, and one representing the Navy: Colonel Adamson for the Army and Commander (since Admiral) Hoover for the Navy.

Holding that as an expert I ought not to be injecting political views, I have throughout my work remained an associate regardless of party and other affiliations. I have the honor to know ex-President Hoover, and I was very pleased to find a namesake of his concerned with these scientific problems, as President Hoover during his incumbency as Secretary of Commerce did a great deal for the advancement of science and scientific research.

As the central figure, the President named a Government individual who was concerned with problems of science, the Director of the Bureau of Standards, Dr. Lyman J. Briggs, who rendered great service during the critical period.

I got in touch with Dr. Briggs that very night, before having to go again to the White House to report progress to the President. For the potentialities of this were very much in the mind of the President, and he had remarked, "Don't let Alex go without seeing me again."

I saw him later that night, and the resultant idea was to hold a meeting in the near future. A meeting was scheduled after this October 11 conference at the White House, for October 21.

I reported to Professor Wigner, who throughout this period occupied a pivotal role because he is highly esteemed and was perceptive on what you might call the political problems. I reported to him in a letter of October 17, and I sought throughout the interval to broaden the group of scientists who were to attend that conference.

Senator VANDENBERG. How about the Einstein letter you referred to?

Dr. SACHS. The Einstein letter of August 2, from which I quoted in part in my own letter, was left with the President, along with my letter.

The CHAIRMAN. Have you a copy of it?

Dr. SACHS. That is part of a record which I will leave with you gentlemen, which was a report I prepared immediately after the announcement about the use of the atomic bomb in August for the White House, for the Department of Commerce—Mr. Wallace as the successor in charge of the Department that had such an important role through the Bureau of Standards—and for the War Department.

The CHAIRMAN. Does that contain your letter?

Dr. SACHS. It contains all the documents, sir. It contains Einstein's letter, and it contains other memoranda.

I had throughout this period sought to be a historian, because the President said to me, "Pa Watson is going to be too busy to be a historian; you had better do that."

I made contemporaneous reviews, and would submit them as galvanizers of action.

I have a copy of Einstein's letter, a duplicate, which has his signature, and I will leave that copy with you.

Senator VANDENBERG. Could you state in a sentence or two the import of Einstein's letter?

Dr. SACHS. Yes, sir. [Reading:]

"Some recent work by E. Fermi and L. Szilard, which has been communicated to me in manuscript, leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future. Certain aspects of the situation which have arisen seem to call for watchfulness and, if necessary, quick action on the part of the administration. I believe therefore that it is my duty to bring to your attention the following facts and recommendation."

He then describes the new phenomenon, and states that the sources of practical supply are outside the United States; that the United States has only very poor ores of uranium in moderate quantities, and that there is some good ore in Canada, and the former Czechoslovakia. As to that, he reports:

"I understand that Germany has actually stopped the sale of uranium from the Czechoslovakian mines which she has taken over. That she should have taken such early action might perhaps be understood on the ground that the son of the German Under Secretary of State, von Weizsaecker, is attached to the Kaiser Wilhelm Institute in Berlin, where some of the American work on uranium is now being repeated."

In other words, there was political interest being taken in the work. So Dr. Einstein said that one of the ways in which the administration could be helpful was to entrust this task to a person "who has your confidence and who could perhaps serve in an unofficial capacity." His task might comprise the following:

"(a) To approach Government departments, keep them informed of the further development, and put forward recommendations for Government action, giving particular attention to the problem of securing a supply of uranium ore for the United States.

"(b) To speed up the experimental work, which is at present being carried on within the limits of the budgets of university laboratories, by providing funds, if such funds be required, through his contacts with private persons who are willing to make contributions for this cause, and perhaps also by obtaining the cooperation of industrial laboratories which have the necessary equipment."

These scientists, as you see, gentlemen, were no doctrinaires, but indicated a practical perceptiveness—ready to use whatever means were available so that the Government and the Nation secured a supply and funds for going ahead with this thing.

The next meeting that was held was on October 21 in Washington under the chairmanship of Dr. Briggs of the Bureau of Standards, and there was a survey made of the whole situation. Many scientists were there who were not as concerned as these refugee scientists, for, as I tried to explain, gentlemen, the latter, in addition to their interest in the advancement of science, were interested in the imperiled position of the United States and civilization. They were infused with a concern in the Quaker sense of the word of devoted interest and responsibility. Many of the other scientists said: "This is very remote; we have got to wait and see; there are other lines of progress rather than the chain reaction that may be more attractive." The discussion wandered all over attractive side issues.

The one who occupied the intermediary and catalytic role in behalf of the President had then to ask these American men of science and the Government officials, including the Army and Navy representatives, to indulge—and I re-

member using the phrase of the Irish poet Yeats, echoing Coleridge—in a “willing suspension of disbelief.”

The issue was too important to wait, because if there was something to it there was danger of our being blown up. We had to take time by the forelock, and we had to be ahead of the Germans.

One great advantage that we had was that these refugees, these scientists themselves, responded to that very spirit of freedom that brought the Pilgrim Fathers over here, the search for the freedom of speech and religion and, if you will, free science and free thought. They were saturated by ideas and motives which the regimented scientists could not have, and so the transplanted and the American scientists, if given the means, would make advances much faster.

In the wake of that conference, a subcommittee was appointed, notwithstanding those expressions of doubt. The subcommittee was presided over by Dr. Briggs, and on behalf of the services, Keith F. Adamson, lieutenant colonel, United States Army, and Gilbert C. Hoover, commander, United States Navy. A report was written to the President dated November 1, 1939, on the stationery of the National Bureau of Standards of the Department of Commerce, which reviewed the situation technically and culminated with this observation:

“3. The energy released by the splitting of a mass of uranium atoms would develop a great amount of heat. If the chain reaction could be controlled so as to proceed gradually, it might conceivably be used as a continuous source of power in submarines, thus avoiding the use of large storage batteries for under-water power.”

(I would not have wanted to limit it to this form, but a continuous source of power was the fundamental idea.)

“4. If the reaction turned out to be explosive in character it would provide a possible source of bombs with a destructiveness vastly greater than anything now known.

“The military and naval applications suggested in paragraphs 3 and 4”—in this case he was expressing the not quite suspended disbelief of the representatives of the Services; voicing their greater skepticism, Dr. Briggs said that the military and naval applications “must at present be regarded only as possibilities because it has not yet been demonstrated that a chain reaction in a mass of uranium is possible. Nevertheless”—and in this respect these representatives were willing to go ahead—“in view of the fundamental importance of these uranium reactions and their potential military value, we believe that adequate support for a thorough investigation of the subject should be provided.”

There had been a previous adverse report that I had known about, which was given by a technical adviser of one of the Services in the summer, and it was because of that adverse report that they didn't see any reason for being interested, although they wanted to be kept informed, that I was brought in to go directly to the Commander in Chief.

So they concluded:

“We believe that this investigation is worthy of direct financial support by the Government.”

But, alas, we had no money.

“The Lea bill now before Congress if enacted would provide for carrying out important investigations of this kind in cooperation with the universities.

“We recommend the enlargement of the committee to provide for the support and coordination of these investigations in different universities. We suggest the following be invited: President Karl Compton, Massachusetts Institute of Technology; Dr. Alexander Sachs, 1 William Street, New York” (that was my address at Lehman Bros., who were very kind to let me devote time, and did not ask me to tell them what it was about. Mr. Robert Lehman is particularly to be thanked for this, and a man who afterward became an adviser of the War Production Board, and later Deputy Chairman, Mr. Arthur H. Bunker, who was then executive vice president of the Lehman Corp.)

The people who were asked to be added were Prof. Karl Compton, myself, Prof. Albert Einstein—I am reading this in the order given there; I belong very much at the foot of any such list—Prof. Albert Einstein of the Institute for Advanced Study, and Dean George B. Pegram, Columbia University.

As a sequel to the major finding and recommendation, the committee proposed that initial support take the form of:

(a) Supplying for immediate and experimental work four metric tons of pure-grade graphite; and

(b) If later justified, supplying 50 tons of uranium oxide.

Later on there were all kinds of difficulties about getting the supply, to which I referred. Late that year and in the following year there was another newcomer, an industrialist-engineer by the name of Boris Pregel, who made available his very valuable supplies and experience to Columbia University for the experiments of Dr. Szilard and Professor Fermi, for which he was thanked by Dean Pegram.

The first phase was to coordinate the group of physical scientists for the purpose of presenting the idea to the President. The second phase was the securing of action by the Government, and that was climaxed by the report, which was a go-ahead signal, that Dr. Briggs wrote on November 1, 1939.

If you hear in mind how narrow has been the time, how correct was the concept of the memorandum from which I read of March 10, 1939, that the job was “time-borrowing, the issuance of drafts on the ‘Bank of History,’” it becomes plain that if the work had not been thought through before the advent of the war, and if the President had not taken action immediately after, and if the report of the Bureau of Standards and its technical head had not come forth on November 1—the bomb could not have come when it did toward the end of the war to abbreviate the war in 1945. From all this you will realize that the time-borrowing was very essential, and along with it the finding and improvement of the organization media for the successive tasks of the year 1939 and the year 1940 and beyond. In the ensuing period I was an adviser of the President also on problems of strategy. I was also a special consultant to General Donovan, Director of the Office of Strategic Services, for whom I had written in 1941 the first report on the intellectual work that was being done in outside institutions on problems of totalitarian war economics, as well as strategy, before the organization of the Office of Coordinator of Information, that afterward became the Office of Strategic Services.

Through these connections I was able to keep in touch, and I was in turn kept in touch, on the basis of great confidence, with the White House on what was going on, so I knew what was happening even to the very last. I discussed the problem of the form of the use of the bomb with the President early in November 1944, when I submitted a memorandum on the Final Phase of the European War and Emerging Phases of Far Eastern War Liquidation—which contained a forecast that the war would end in April or May, and that there would be no last-ditch stand, but the whole German system would collapse.

Though I have kept in touch, my official role as the representative of the President continued up to the time when, as you will see, I submitted to him the idea that it must be given over to an organization in charge of all scientific development, and suggested Dr. Bush, of whose keen interest and ready aid I had learned in the course of the difficult months of 1940.

Many of the pivotal figures are not now alive; the President is dead. General Watson, who rendered very great service, is dead. I well remember his report that in talking to military and naval men who had said, “Well, this is still so remote; what is this thing?—let's wait and see,” “Pa” Watson would say, “But the Boss wants it, boys.” That was the theme song of “Pa” Watson. He is dead, and the secretary who used to call me up and pass on White House messages is also dead.

These documents that fortunately were written represent the main available records of the flux of events, apart from scraps, and the scraps that are available in the files are insufficient to give a correct picture. One gets a picture from some of the things that have been published that there was a linear progression. Like all human undertakings, it was full of set-backs, difficulties, conflicts between perceptiveness and willingness on the one hand, and doubts and negations on the other, and it required continuous prodding. Such work as I was able to do, I was able to perform because everyone knew I was not concerned about anything but the progress of the work and had made myself anonymous. If I may again quote the New Testament, there is a verse in First Peter, “Be ready always to give answer to anyone that asketh of you the reason of the hope that is in you, with meekness and fear.” I felt that I and the others had to go on with this work, and that it must go on, and so I sacrificed my time and concentrated on that. Later on, as a matter of fact, when the war broke out, I resigned from my administrative post and became a private economic adviser and was the better able to devote myself to war work to a considerable extent.

Prior to that, in the summer of 1941, I had given to the Navy a plan that was worked out with the aid of a great engineer, Dr. Emil Mayer, for the use of detector radiosonic buoys for the establishment of an Atlantic security lane originally for the lend-lease shipments. This substantially was afterward

adopted by the Navy through technical work under Professor Hunsacker of MIT and the fostering concern from 1942 on of Mr. Lewis Douglas, then Deputy Administrator of the WSA.

Thus with regard to the adoption of all such technical devices I want to etch in this consideration: that in the beginning there had to be a political concept and a moral concern, and that later it was necessary to provide proper vehicles for action and also to induce acceleration of action.

The third stage in the atomic project was the coordination phase of the university researches with limited governmental aid and pressure—by Einstein and the speaker—for a new framework and an accelerated tempo for the project.

While a number of the university representatives were encouraged by the governmental interest, the fundamental tenor and the tempo of the work remained, on the whole, continuous with the past—that is, they were regarded as mere laboratory researches.

The time of this phase was approximately coincident with what was called then the "phony" war. This was the time of the war which embraced the period between the fall of Poland and the Nazi invasion of the Lowlands.

You can well realize that the President during this period was pressed by and preoccupied with numerous internal and international problems. Our liaison for the project, General Watson, orally conveyed the general tenor to the President of Dr. Briggs' report. While he had done that, he thought when, after an interval, he transmitted it to me on February 8, 1940, that a more pointed conclusion was still necessary. He added that he had asked for a special recommendation from Dr. Briggs.

Meanwhile, some progress was made in the coordination of the university researches by the Coordinating Committee mentioned in the concluding point 8 of Dr. Briggs' report. The appointment of Dean Pegrum served to focalize activities in Columbia on this project and frequent conferences were held there by the speaker with Drs. Pegrum, Fermi, and Szilard.

In mid-November of 1939, our group had projected an octet of experimental projects in the hope that the subsidiary questions could be cleared within a period of 6 months. In notes that were made at the time, I listed the nature and scope of these subsidiary problems and the recommended leading figures from nearby educational institutions working on these problems. Of the new men brought in the most important was Prof. Harold C. Urey, who had won the Nobel Prize for his work on heavy water.

After the turn of the year, the Columbia project became the recipient of governmental aid in the form of limited funds intended for the purchase of materials, as is borne out by the reply that Dr. Briggs made on February 20, 1940, to General Watson's note of February 8, 1940.

But Dr. Einstein and myself were dissatisfied with the scope and the pace of the work and its progress. The speaker conferred with Dr. Einstein at Princeton in February. I went out to see him there and developed an inquiry as to the importance of the work that was being carried on at the time in Paris, work that had been described in a contemporaneous issue of Science. While we felt that it was very important that this free trade in ideas—to use an expression of Justice Holmes in one of his great and discerning decisions—that this exchange of ideas among free scientists should be carried on because they served as links and as stimuli to future work, their accessibility through publications to Germany constituted an important problem. Nonetheless, it was advisable to secure comparative evaluations and in response to my question about the work of the French, Dr. Einstein said that he thought the work at Columbia was the more important. He further said that conditions should be created for its extension and acceleration.

Accordingly, I sent, on February 15, 1940, to General Watson a plea for larger aid and an intimation that presently Dr. Einstein would give a favorable evaluation of the work which had been completed at Columbia.

(The letter referred to is as follows:)

FEBRUARY 15, 1940.

Gen. EDWIN M. WATSON,
Secretary to the President,
The White House, Washington, D. C.

DEAR GENERAL WATSON: Thank you very much for your letter of the 8th and the accompanying report of Dr. Briggs to the President, both of which will be treated as confidential. Had the recommendations from the second part of point

5 through points 6 and 8 been placed ahead of the more technical points 1-4, the practical meaning of the letter would have been clearer and more forceful; namely, that in the opinion of Dr. Briggs and his colleagues it was distinctly worth while to go ahead. Due to too academic a presentation, I feel that that practical point was lost.

As the last issue of Science contained a quotation from Science Letters bearing on work in Paris, and as, since our meeting, there has been even more searching and significant work in this country, I shall take the occasion to submit within the next month an up-to-date appraisal of the situation which, according to Dr. Einstein in a recent conversation, holds forth even greater promise than we had thought.

With kind regards and appreciation,
Yours sincerely,

ALEXANDER SACHS.

Dr. SACHS. Ensuing conferences which I had with Dr. Einstein prompted the suggestion that he prepare another review of the situation for submission to the President. I had felt that Dr. Einstein's authority was such that, combined with his insight and concern, it would affect the tempo of the work. His review, which was dated March 7, was written as a letter to me. I will read the opening and closing paragraphs of this letter, addressed to me at my office at the Lehman Corp.

"In view of our common concern in the bearings of certain experimental work on problems connected with national defense, I wish to draw your attention to the development which has taken place since the conference that was arranged through your good offices in October last year between scientists engaged in this work and governmental representatives."

He also reported that he had learned of the further work that was going on in Germany since the outbreak of the war, the work on uranium. He pointed out that this work was being intensified in Germany. I shall quote a portion here:

"I have now learned the research there is being carried out in great secrecy and that it has been extended to another of the Kaiser Wilhelm Institutes, the Institute of Physics."

The sources of such information are not only personal communications but also scattered references in technical publications that can be made to throw light on what goes on. By this process even under the totalitarian system secrets come out. Similarly, under our freer system things can come out in an impersonal way. They did come out even while we were taking terrific measures, and very rightly so. Yet by inadequate attention to technical sources those measures proved in one not unimportant instance rather ineffective. I refer specifically to the unwitting disclosure by the Minerals Yearbook of 1943. On page 828 of that book, in the course of a very technical statement about uranium, there is such a reference to the use of uranium for potential war purposes in 1943.

Senator TYDINGS. Was that our book, or was it a German hook?

Dr. SACHS. It was our book, the Minerals Yearbook for 1943, on page 828. At the very time that newspapers and editors were not even to breathe the word "atom," the Minerals Yearbook of 1943, page 828, said, with reference to uranium, "Uranium production in 1943 was greatly stimulated by a Government program having materials priority over all other mineral procurements, but most of the facts were buried in War Department secrecy." Then it goes on to say, "Most of the 1943 uranium supply was used by physics laboratories for research on uranium isotopes as a source of energy." These technical books went everywhere, they were available by the ordinary routine to the technicians who would not have to read between the lines.

Thus secrets leaked out. To a different degree this sort of thing obtained even in the hermetically sealed German system. It is inherent in the situation.

As I said, Dr. Einstein wrote me on March 7, 1940. He stated that research on uranium had intensified in Germany.

"Since the outbreak of the war, interest in uranium has intensified in Germany. I have now learned that research there is being carried out in great secrecy and that it has been extended to another of the Kaiser Wilhelm Institutes, the Institute of Physics. The latter has been taken over by the Government and a group of physicists, under the leadership of C. F. von Weizsaecker, who is now working there on uranium in collaboration with the Institute of Chemistry. The former director was sent away on a leave of absence apparently for the duration of the war.

"Should you think it advisable to relay this information to the President, please consider yourself free to do so. Will you be kind enough to let me know if you are taking any action in this direction?"

I shall skip the next paragraph. Then he wrote:

"I have discussed with Professor Wigner of Princeton University, and Dr. Szilard the situation in the light of the information that is available. Dr. Szilard will let you have a memorandum informing you of the progress made since October last year so that you will be able to take such action as you think in the circumstances advisable. You will see that the line he has pursued is different and apparently more promising than the line pursued by Monsieur Joliot in France about whose work you may have seen reports in the papers."

I had, throughout, followed the policy not only of being an expert on tap, but of going to other people's experts to see what they were doing. When it came to scientific work, I left that to the scientists. I did not presume, when I forwarded these memoranda written by Dr. Einstein, Dr. Szilard, and the others, to act other than as a synthesizer for them.

I passed on Dr. Einstein's review of the situation to the President on March 14, 1940, asking for an opportunity to confer with him on the latest phases of the experimental work.

(The letter referred to was entered in the record of the committee and appears below:)

MARCH 15, 1940.

The PRESIDENT,
The White House, Washington, D. C.

DEAR MR. PRESIDENT: As a sequel to the communication which I had the honor to submit to you on October 12, Prof. Albert Einstein sent me another regarding the latest developments touching on the significance of research on uranium for problems of national defense. In that letter he suggests that I convey to you the information that has reached me that since the outbreak of the war, research at the Berlin Institute of Physics, which has been taken over by the Government, was placed under the leadership of C. F. von Weizsaecker, son of the German Secretary of State.

In the realization that these further views of Dr. Einstein have a definite bearing on the favorable report submitted to you by Dr. Briggs as chairman of the committee which conferred with experimental scientists concerned and myself, I am enclosing his communication for your kind perusal. May I also ask whether and when it would be convenient for you to confer on certain practical issues brought to a focus by the very progress of the experimental work as indicated in the concluding paragraph of Dr. Einstein's letter?

In view of your original designation of General Watson in this matter, I am transmitting it through his good offices.

Yours sincerely,

ALEXANDER SACHS.

Dr. SACHS. The reply of General Watson on March 27, 1940, was to the effect that the governmental committee was awaiting "a report of the investigations being conducted at Columbia University" and hence "the matter should rest in abeyance." I did not feel that I could rest.

Senator TYDINGS. "In abeyance"?

Dr. SACHS. Yes. For the sense of foreboding about Nazi aggression that had been voiced before the outbreak of the war—as I disclosed previously—impelled me to relate the expectations of new invasions in the wake of spring to the instant project.

At the beginning of April, opportunity was afforded the speaker in the course of a visit to the White House to unfold views on the probable course of German aggression as encompassing in this war—as distinguished from the last war—the elimination of neutrals so as to secure complete control of the coast from Norway to France. It had this bearing on the uranium project: It was suggested that diplomatic arrangements be made for the shipment of uranium supplies from Belgium to the United States, instead of shipment on the eve of invasion to France, to avoid their probable capture by the Germans in their military onrush through France.

Taking the project as a whole, it was urged that instead of delimited aid in the form of specific material purchases or reimbursements for expenditures by universities, a fund be made available from governmental sources or by persuading foundations to allocate a fund in order that research could be planned on an adequate scale and on a long-term basis.

I had also another thought in mind in making that suggestion that the late spring months were not too early for the planning of the enlargement of the research personnel; to wit, around April and May the scientists were being booked up for the next year's work in the universities and if we did not take them then, we were not going to have them later on. So, our job was to divert academic talent from teaching to research, to public research. Otherwise, the right kind of people, the people we wanted, would have completed their negotiations with faculties for the next academic year.

The tenor of these considerations and recommendations was embodied in an aide-memoire which I prepared in Washington and left with the President as a review of the situation: "Import of War Developments for and Application to Natural Defense of Uranium Atomic Disintegration," April 20, 1940.

The fourth phase was the phase which I have called in this report written immediately after the events, in the role of contemporaneous historian which the President assigned to me—"efforts by the originators of the project to gain the adherence of the governmental and advisory group to organizational changes needed to attune the research to the urgencies of unfolding World War events."

The representations made to the President at the end of March and early April, as just summarized, led him within a few days to revert to and act upon my preceding correspondence that had been pitched in the same key.

Accordingly, on April 5, 1940, he acknowledged what had been conveyed to him and proposed that a new conference be held in Washington between Dr. Einstein and the speaker on the one hand, and Dr. Briggs and the special representatives of the Army and Navy on the other hand.

The closing paragraph of that letter indicated that the President wanted the research continued: That is, the preliminary questions about which a few in the coordinating group still retained tints of doubt were in his mind disposed of.

To General Watson was delegated the making of arrangements for the conference, but the President wanted to be advised directly of the results of the conference.

Under even date, General Watson asked the speaker for a list of scientists to be invited, inclusive of suggestions by Dr. Einstein. The inquiries made by the speaker of Dr. Einstein and other members of the coordinating group led to the submission to General Watson of the requested list.

Throughout my work I was in touch with Dr. Wigner of Princeton, Dr. Szilard and Dean Pegrum of Columbia and, later on, also Urey.

Following the receipt on April 13 of the two letters from the White House of April 5, Dr. Einstein was written to on April 15. My letter opened with a statement regarding the transmission to the President of Dr. Einstein's communication of March 7 to me. It referred to favorable action taken by the President upon his return from the Canal Zone trip where he had been on vacation. I had gotten in touch with him in the course of that trip, as he had given to this anonymous adviser the privilege of getting through with his messages, and the message so conveyed had contributed to the decision by the President "to adopt the procedure suggested" in the speaker's original communication.

Cognizant of the resistances in the group to the proposed enlargement of the organizational framework, the speaker urged Dr. Einstein to participate in person in the forthcoming conference. However, after a conference which the speaker had with Dr. Einstein at Princeton, it became clear that indisposition on account of a cold and the great shyness and humility of that really saintly scientist would make Dr. Einstein recoil from participating in large groups and would prevent his attendance. So, he delegated me to report for him, too.

As a substitute, I had asked him to enable me to record the consensus of our views in the form of a written communication to Dr. Briggs. That communication, dated April 25, 1940, to Dr. Briggs, which Dr. Einstein signed, referred to the discussions he had had with Dr. Wigner and myself on the progress of the work of Dr. Fermi and Dr. Szilard.

The purport and purpose of the letter was to impart a new impetus and to suggest an appropriate adjustment of the organization side of the research to the interlinked necessities of the emergent phase of the research and of the international situations.

I should like to quote from that letter.

"I am convinced as to the wisdom"—

The CHAIRMAN. Whose letter was that?

Dr. SACHS. This is Dr. Einstein's letter, which I brought with me, to Dr. Briggs: "I am convinced as to the wisdom and urgency of creating the conditions under

which that and related work can be carried out with greater speed and on a larger scale than hitherto.

"I was interested in a suggestion made by Dr. Sachs that the Special Advisory Committee supply names of persons to serve as a board of trustees for a nonprofit organization which, with the approval of the governmental committee, could secure from governmental or private sources, or both, the necessary funds for carrying out the work."

"Given such a framework and the necessary funds, it (the large-scale experiments and exploration of practical applications) could be carried out much faster than through a loose cooperation of university laboratories and Government departments."

You must bear in mind that this was before the fall of France and the Government executives had no money.

We were trying to take this thing out of where it was. This was the viewpoint of those who, having made their venture of faith, sought assistance adequate to the need, as distinguished from other scientists who were content with what I called, in the memorandum to the President, a bit-by-bit procedure. Since we realized the import and pressure of international events, we wanted the thing lifted out of the somewhat monastic type of research that goes on in universities, a slow-motion process on very limited scale. We wanted both larger scale and much faster tempo.

Originally, the April meeting was scheduled by Dr. Briggs for April 22, and so far as nongovernmental people were concerned, was to be limited to Dr. Einstein, Dean Pegrum of Columbia, and myself. Then by telegram of April 20, the meeting was postponed to the 27th. In the interim I sought to enlarge the group and I requested that an invitation be sent to scientists and executives in universities involved in the current uranium research.

That request was granted, as appears from my letter to the President of May 11, 1940.

(The letter referred to was entered in the record of the committee and appears below:)

MAY 11, 1940.

The PRESIDENT,

The White House, Washington, D. C.

DEAR MR. PRESIDENT: In furtherance of your kind letter to me of April 5, the conference suggested by you was arranged and held under Dr. Briggs' chairmanship on April 27, between the governmental and nongovernmental groups concerned with the bearing of uranium experiments on national defense. With the conclusion of the first experiment, which was conducted at Columbia University by Drs. Szilard and Fermi, with governmental aid, the whole project is now entering upon a new stage. Assuming that the governmental committee will now, upon your inquiry, report in favor of further and larger governmental action, may I, in accordance with your own gracious expression of a desire to be advised of developments, submit the following considerations and suggestions:

1. With the invasion of Belgium by the very power which has organized the residue of its scientists for uranium work, the danger—alluded to in my original letter to you of October 11, 1939—that America may be cut off from uranium supplies of the Belgian Congo has increased. In addition, the successful completion of the above-mentioned preliminary experiment renders it practicable and advisable that the action to be taken shall be adequate and comprehensive.

2. Such action inherently involves not only larger financial support to be accorded by the Government but also the formation of an organizational framework under which the work can proceed with the flexibility required for a going enterprise. Interestingly enough, the latter practical aspect has been emphasized by Dr. Einstein in conversations with myself and was communicated by him in a letter to Dr. Briggs, of which I am enclosing a copy for your kind perusal and attention. In this connection you might find of interest the enclosed copies of two communications which I have received from Dr. Szilard, the first of which contains a synoptic statement of the implication of the work for national defense that was made orally at the above-mentioned conference of April 27, and the second an outline of the next tasks to be undertaken.

3. The resultant requirement for forming an organization for directing the work outside of governmental institutions and for assuring that work by scientists in the universities is carried out with due secrecy has to be dovetailed with the designation of persons to serve as trustees of a nonprofit organization that is to supervise the allocation of funds and to coordinate the various branches of the work.

4. These interlinked needs suggest to me that it would be desirable to bring one of your legal aides into the circle of discussion, along with General Watson, who is now serving so efficiently as a liaison for the representatives of the service departments and the Bureau of Standards.

In view of the urgency of a decision on these points, I should greatly appreciate conferring with you in the course of next week, at your convenience.

Yours sincerely,

ALEXANDER SACHS.

Dr. SACHS. That, then, is the background against which the conference was held, a background which was lit up by portentous international events. The second week of the month opened with the German invasion of Norway and Denmark on April 9; the third week witnessed counter operations by the British, the landings in Norway on April 16 and April 18.

Since the concern for national defense and the survival of civilization motivated my mediation of the project between the scattered scientists and the President, it is understandable that in the flux of erupting international forces I should seek to transpose the laboratory questions to the larger theater of international policy and military operations.

Two contemporaneous crystallizations of that preoccupation are available. The first is a memorandum-letter prepared at my request by Dr. Szilard under date of April 22. The second is the already referred to memorandum for use with the President, dated April 20, 1940, and bearing the title "Import of War Developments for and Application to National Defense of Uranium Atomic Disintegration."

Skipping the very technical side, I want to mention the—

The CHAIRMAN, Doctor, I am sorry, but we have to recess at 12 o'clock. So, if you will, we would like to have you bear that in mind.

Dr. SACHS. All right, sir. I will pick an appropriate place.

The memorandum-letter by Dr. Szilard aimed to describe the next phase of the research and its dual alternatives and their respective applications to national defense. The first case deals with chain reactions in which the neutrons are slowed down so only a small fraction of uranium can be utilized. In the second case, the neutrons are not slowed down and so the bulk of the ordinary uranium can be utilized. It is the latter case which has the greatest significance for national defense and particularly for the production of atomic bombs. The former significance would appear to lie in power production. Both would also present the complication that personnel handling such atomic engines would be exposed to the radiations.

The second alternative also presented a dual utility for concentrated power and concentrated explosives. As to the second use, the concluding paragraph of that memorandum constitutes a most illuminating formulation:

"A chain reaction of this second type would make it possible to bring about explosions of extraordinary intensity. If, for purposes of aggression, a bomb based on such a chain reaction were set off at sea near the coast, tidal waves brought about by the explosions might lead to the destruction of coastal cities."

The coincident memorandum of the speaker was concerned with high lighting the bearing of the war developments on the organizational aspects of the uranium research, and evoking applications for naval warfare with a view to throwing into sharper relief the urgencies of providing more central direction and greater adequacy of scope and speed in the prosecution of the project.

I had previously been called in to discuss what would be the results if control of the Mediterranean was achieved by the aggressor. In that connection there was a coincident idea advanced by a person who had been in the Army and who was concerned about this problem, a very great authority and friend of mine, General Donovan. General Donovan and myself had independently perceived that the Mediterranean would for war prosecution against Germany be significant north-south, as distinguished from east-west. We saw that the democracies would be pushed out from the Continent, that the next war phase would push France out as a major belligerent power.

This conclusion did not require so much foresight, as it required a memory with which I happen to be endowed. For the French military people engaged in the last Peace Conference had seen that and stated it. Furthermore, in the book on the Peace by André Tardieu to which Clemenceau wrote an introduction, there is a prevision of the 1940 plight and defeat of France. Clemenceau was a layman who had his own views about military strategy: You will remember he was the man who had remarked that war is too serious a thing to leave it

solely to the military—Clemenceau had seen that development and he expressed himself on it as an insightful layman, who while entertaining complete respect for the performance of the military, can synthesize the military considerations with the political considerations.

Clemenceau had insisted at the Peace Conference, "If you do not give the French the protection at the Rhine, then the other democracies will have no base of operations, no base of support, no jumping-off place for operations by the overseas democracies." Thus mindful of the last war, we agreed we would not even have a base on the Continent. Therefore, the significance of the Mediterranean was going to be north-south and not east-west.

In the light of and following such discussions on the fate of our access by sea to the Continent, I broached the problem of the supply of uranium for the United States. I pointed out that the biggest supply of uranium was in the hands of the Belgians. I pointed out that even if in anticipation of invasion they were to send it to France, it would not come to us. Hence we ought to open, ahead of invasion, diplomatic negotiations.

Incidentally, that industrialist-scientist I mentioned, Boris Pregel, who at the outbreak of the war was in France and was a French citizen, had, it later appeared, asked the French Government in 1939 to make arrangements with the Belgians.

That prescience on the part of these newcomers and refugees, gentlemen, was operative in our cause because they were united by a political sensitivity along with their specific expertise as scientists and technologists.

Now, the memorandum which I submitted to the President opened with a description of the meetings and the work that was being done by other scientists; by the scientists in England, men like Drs. Chadwick and Lindemann, and so on. That work would be available for coordination with research in America. In other words, there was suggested at that time the idea of Anglo-American collaboration. In that already alluded to Cambridge lecture in 1936, it was foreseen that there would eventually be developed a new source of energy; and that lecturer was also aware, profoundly and humanly aware, of the dualism, the good and evil, in such development.

The memorandum then dealt with the tendency to reservations and understatement of the results of research and their implications, the effect of which on governmental representatives was to cause them to recoil from the very suggestions that were being pressed by Dr. Einstein and myself for providing a larger and more resourceful organizational framework for adequate and faster prosecution of the task.

In the effort to overcome the tempo dampening and scale dampening that the other attitude entails—the attitude of conservative hesitation, proper enough in an ordinary task but not for this kind of thing, which required the already designated "willing suspension of disbelief"—in that effort, the speaker submitted the following observations and considerations which in a later presentation to the President appeared to be contributive toward a resolution of the organizational difficulties:

"The present writer, as a nonphysicist"—this is a quotation from my memorandum—"would not of course venture an opinion alongside those cited. But as an economic historian and as a practical economist versed in the conduct of technological research, he has ventured to convey to the scientists mentioned and to the governmental authorities his hypothesis that the difficulties which loom so large now might well arise from the characteristic physical limitations of the pre-prepilot plant operations that are carried on in the typical university laboratories. If the project is fraught with promise and importance for national defense, then it seems to him worth while to approximate very soon the conditions of industrial pilot-plant operations. This might entail the building of equipment, machinery, and even the construction of adequately scaled and adequately protected physical plant.

"Once we relate the uranium research to national defense, it should be regarded in type and tempo to the most advanced technological research that has been carried out by the American chemical and electrical companies."

I need hardly insert parenthetically that it was this scale of operation which was carried out with such distinction later on by General Groves. Returning to the memorandum:

"What has taken place in Poland, Denmark, and Norway, and will doubtless go on through other European countries that will be invaded, is that the pacific-minded countries have not brought their national defense up to the quantity and

quality required for technological warfare. When the import of the European war is assimilated by the American people and national defense is undertaken as a national enterprise, then we may be confident that we will match in war with the progressiveness of our civilian technology and come to surpass it, which means surpassing the German military technology."

In the conviction, then, that "an adequate organizational framework is itself the precondition for the ascertainment and effectuation of the value of nuclear research for national defense," the speaker proceeded to sharpen the possible applications of that research for naval operations—

Senator RUSSELL. What was the date of that?

Dr. SACHS. April 20, 1940, before the invasion of France.

As I say, I proceeded to point out the possible applications for naval operations, on the assumption that the war would in time become global on the part of the Axis, inclusive of Japan, against the democracies, inclusive of the United States.

In that event, the applications in the dual form of telescoped power drive and magnified explosives should aid the United States to overcome "the disadvantage under which we labor due to the enormous distances between continental United States and our possessions, and between our possessions and the Japanese homeland."

This was not warmongering, this was adjustment to the import of events as I saw them, as I followed the phenomenal developments.

If I may quote again from the Bible, from the Twenty-fifth Jeremiah: the nations were successively "taking the winecup of this fury at the Lord's hands and drinking it." I could see that we would all be engulfed; that on the Continent, only Great Britain would be left; and that we would be the only major continental-insular power left in the universe and that then we would have to take action. I saw that we must not let Germany get ahead with atomic research on the kind of weapon they were working on, a weapon whose essence is the elimination of time for the defense, the elimination of that borrowed time that we all needed so badly in this war.

Inasmuch as the attempt to relate the applications to strategic and logistic configurations presupposed naval data, Dr. Briggs' good offices with Admiral Bowen and Commander Hoover brought answers to questions I submitted in a letter. I did not have a copy of that letter for inclusion in my report.

As the sequel to my April 1940 activities was to place the atomic project on a new plane, this new stage of the work in progress provides the occasion for drawing attention to a needed revision in the fast-crystallizing misconceptions of the project's history. The historical review I have given from the contemporaneous record that I kept for the President as a guide to his decisions and actions shows that the development of the atomic bomb was not the linear progression from a single decision that people have spoken and written about. You will remember the story in Alice in Wonderland about the Queen and Bill Lizard: how the Queen started with the end, or the sentence to be imposed, and then worked back. So there is a tendency when it comes to writing history for people to say in the instant case: We have got the bomb and we used it; therefore, the order of development must have been present throughout. Actually there was no such straight line, but rather a zigzag of lines. Moreover, every bit of effort that was applied to evolve and effectuate the eventual right policy was indeed indispensable. Every right effort, however apparently infinitesimal, becomes in retrospect infinitely important for what gave us not only the weapon but the timely use for shortening the war.

As to the role played by the bomb, while it assuredly shortened the war, it must also be recognized that Japan had already been, on normal military calculations, beaten. The timing was so right because of what had been done toward beating Japan by the Navy, the Air and other military power, and also by the economic and other factors. We must not in our concern with the new weapon tend to eliminate all the other elements that constitute the whole organization of our national defense and offense. Thus we needed those bases protected by the Navy and the Air Forces to use for the bombing and so the application of the bomb was conditioned by the success of the other war operations with the other war technologies.

All the same, the bomb presents a new factor—a most vital factor. But I cannot now go into those questions and instead I must return to the history in the crucial phase.

The conference of April 27, 1940 on organization framework and the inadequacy of what we had then, resulted in new submissions to the President for a resolution of the difficulties.

The conference that was held on April 27 at the Bureau of Standards under Dr. Briggs' able and conciliatory chairmanship did serve to dispel doubts that had been entertained by some members. It also marked further progress in evoking a willingness to entertain consideration of large-scale expenditures that might run up to six figures. That was fantastic, alongside the cost theretofore—the thousands that were being spent and the money that was being furnished by those who were on the margin, who were spending out of their own pockets in connection with this work in corresponding amounts. Yet the majority, accustomed to the small scale of physical laboratories at the universities and the correspondingly reduced scales of the budgets of governmental scientific laboratories, did not appear ready to design a large-scale and comprehensive program, and instead insisted on "bit-a-bit" procedures with ranked preferences and time deferments.

By the beginning of May the uranium research at Columbia, which was the pathfinding research, had reached the point where expansion was deemed advisable and desirable by the whole quartet of scientists concerned—that is, by the direct experimenters, Drs. Fermi and Szilard, and by Dean George Pegram and Prof. Harold Urey.

After a number of conferences by the speaker with the Columbia group, a sort of minute was drafted as of May 10 embodying the consensus as to the successive stages. In this case, I myself did the secretarial work.

The first point in this minute was:

"The first large-scale experiment would have as its aim to demonstrate beyond any doubt whatever that a nuclear chain reaction could be maintained in a system composed of carbon and uranium. This would require about 100 tons of graphite and some 10 to 20 tons of uranium metal. It would also be necessary to design a rather elaborate mechanism to stabilize the chain reaction and to safeguard against overheating as well as the possibility of an explosion."

The second point was:

"The next stage is to carry out a general survey of all nuclear constants in order to confirm the values previously obtained and to narrow down the limits of experimental error beyond observed values of the constants. This would strengthen the assurance of the group in the ultimate success of the experiment.

"Then as preparatory ground for that experiment would come the advancing of structural details and the carrying out of technological tests on samples of materials which have to be used in large quantities in the ultimate experiment. This in turn would require getting bids for the manufacturing of the material in needed quality and quantity."

As to quality, the problem of refinement was throughout a very grave one: it was the industrial know-how which had to be acquired, as well as the fundamental scientific research.

In financial terms, the first stage would require expenditures of \$30,000 to \$50,000; the second stage would require from \$250,000 to upward of \$500,000.

It was the speaker's view that in the interest of time-efficiency and even of economy, the second could be prepared for while the first was going on, providing that adequate funds were made available to begin with. The proposal which had been submitted for a nonprofit organization directed by a mixed board of trustees seemed, under the conditions antedating the prospect of large defense appropriations, particularly suited to methodical and economical direction of the work.

The lack of resolution of the organizational difficulties led the speaker to submit an analysis of the situation and resultant recommendations in a communication to the President dated May 11, 1940, together with a note of transmittal to General Watson of even date.

The point of departure was—I am coming to the end of this section, that may serve as a terminal point.

The CHAIRMAN. Very well, Doctor.

Dr. SACHS. The point of departure was that, according to the advice given to the speaker by Dean Pegram, the graphite experiment, which had been partly financed by the Government, was a success. As the communication was coincident with the German march through Belgium, the invasion having begun on May 10, the situation adumbrated in the initial presentation of October 11, 1939, had come to pass. I mean the situation I had presented when I stated that we should acquire uranium supplies from all Belgian sources had come to pass. A problem of access to uranium supplies that would be needed on a larger and larger scale had been thrust forward. This in turn threw into sharper relief

the previously described need for that change in the organizational framework "under which the work could proceed with the flexibility required for a going enterprise."

The President was therefore requested to designate a legal aide to facilitate the establishment of a nonprofit body which would secure the resources for carrying on the work under conditions where the tenure of the research posts would be secure and their equipment and material be amply provided for. I had in mind that large group of scientists that would have to be brought in at that period when they were looking for other university posts. Along with that there should be provision for the necessary secrecy as distinguished from the normal eagerness and competitiveness in early publication of indicated results.

You must see that the job was to transform the conditions and to anticipate the time-order in normal use. Even for getting the scientists, you had to take into account the fact that we were preventing them from having what is the biggest asset to the scientist—the knowledge that the results of their research will get published when they do important things. So you have to give them adjustments in salaries. There was no time to delay. If we delayed, then we would be losing the scientists. Additionally, at that time—this was before the invasion of France—you would have to see to it that all this work, in view of its potential value and its potential danger, was not made known to the potential enemy through the scientific magazines, such as *Science* and the *Physical Review*, and related foreign publications.

Is this a good stopping point, Mr. Chairman? I could go on. What do you say, sir?

The CHAIRMAN. Doctor, the Senate meets at 12 o'clock.

Dr. SACHS. All right, let me go on, then. This is a very short section.

The CHAIRMAN. All right.

Dr. SACHS. This is part 6 of my history, assembled at the end, in August, from the notes and reviews that were made contemporaneously with the developments. The heading is: Resolution of the Difficulties and Resetting of the Uranium Project into the New Organization Established by the President on June 15, 1940, for the Direction of All Scientific Developments Related to National Defense.

The CHAIRMAN. What was the date that the small-scale stage ended and that you were to go forward on the large scale?

Dr. SACHS. Between May and June it was decided that we needed to go forward on the larger scale. The appointment of a new organization, the Office of Scientific Research and Development, came, I think, on June 15, having been preceded by suggestions of such a scheme that I transmitted to General Watson.

Senator AUSTIN. This was 1940?

Dr. SACHS. This was in 1940.

In keeping with the practice of full knowledge and cooperativeness with the Presidential representatives from the Government services to direct the joint committee on the uranium project, the letter to the President of May 11 was given a counterpart in the communication to Dr. Briggs of May 13, 1940. That is, I did not do anything with the President without sending a copy or speaking about it to Dr. Briggs, as the administrator-scientist, or to General Watson, as aide to the President.

My letter to Dr. Briggs drew attention to Dean Pegram's favorable report on the graphite experiment and inferred that the governmental committee would report favorably to the President on the project. That would be reported directly to the President and I was convinced enough that it would be certain to be recommended.

Recognizing that university research is inherently characterized by what I called a "traditional discursive attitude and leisurely tempo," the contemporaneous facts of the invasion of Belgium threw into sharper relief the requirements of national defense. Applied to this project, those requirements were for a resourcefulness of operation and an acceleration of pace, and also a secrecy that could not be had in the university projects, generally carried on with limited means and in an atmosphere of mutual interchange. And I want to say here that the scientists, Dr. Szilard, Dr. Wigner and Dr. Einstein, were all of the same view, that there had to be secrecy against leaks to the enemy.

In furtherance of the foregoing, another letter was written to General Watson on May 15, the second and revised version of which is included here.

(The letter referred to was entered in the committee's record and appears below:)

MAY 15, 1940.

Gen. EDWIN M. WATSON,
Secretary to the President,
The White House, Washington, D. C.

DEAR GENERAL WATSON: Confirming the intimation that I had the honor to convey in my letter to the President and in my covering note to you, I have just received a letter from Dean Pegram, of the department of physics of Columbia University, stating that the initial experiment "has now been concluded with satisfactory result," and that "the absorption cross-section of carbon was found to be encouragingly small * * * only about one-third of the upper limit previously reported in the literature." The detailed meaning of that has been set forth in the letters of Dr. Szilard of May 10 and of April 22, which I forwarded to the President; a copy of the latter was also sent to you. Please advise me before any conference on this is arranged.

In connection with an independent matter having to do with economic and fiscal policies for effectuating national reconstruction and defense, I should appreciate your expressing to the President my readiness to submit certain social-minded economic ideas that had interested him in 1936 and 1934, as to incentive devices for evoking large-scale plant investment for national defense and the training and reconditioning of the requisite skilled labor. To the original proposals drafted in 1932, there was added in early 1933—when submitted for the National Recovery Act—a provision authorizing public-works expenditures for national defense, in view of the altered international situation. The ideas and proposals in connection with the original FHA plan submitted in 1933 were later expanded in the second FHA plan that, at the President's behest, was worked out for Governor Eccles' advisers. In keeping with the pattern of these earlier plans, the role of government can be adjusted to specific requirements.

For the instant purpose, the organizational instrumentality proposed is the establishment of a Scientific Council of National Defense, composed of executives, engineers, and economists, acting in behalf of the Government, who should be invested with administrative powers for the testing and execution of technical projects of utility for national defense.

Yours sincerely,

ALEXANDER SACHS.

Dr. SACHS. The main communication of the speaker contains the first adumbration of a plan similar to that later developed by the President for the direction of the scientific work related to national defense. The new suggestion was made in the settling of proposals which the speaker was evolving for submission to the President with respect to amortization and other incentive-tax devices for national defense plant construction. It was my belief that industry had to be related to and integrated for national defense and I had been asked to submit some suggestions. I made many suggestions in my professional capacity as an economist with reference to these problems, apart from my interest in this uranium research.

In respect to the specific problem of an organizational framework that would carry forward uranium research on a bigger scale and at a faster tempo, the new conclusion and recommendation of the writer was as follows, against the background that the Government was then thinking of going to the Congress with a request for bigger appropriations:

"For the instant purpose, the organizational instrumentality proposed is the establishment of a Scientific Council of National Defense, composed of executives, engineers, and economists, acting with administrative powers for the testing and execution of technical projects of utility for national defense."

In acknowledging that letter, General Watson on May 16 added an observation regarding the broader suggestion for a mixed executive and administrative group for scientific phases of national defense.

The CHAIRMAN. Was that group formed?

Dr. SACHS. That group was formed on June 15. There was an intervening communication and I had received an authorization after an O. K. and an encouraging word from the President to represent the Government in negotiations with the Belgian company representatives here for the acquisition of uranium.

The CHAIRMAN. Doctor, there has just been a quorum call from the Senate and I think we will have to stop at this point.

Dr. SACHS. May I complete that phase of the story?

The culmination of the foregoing phases of the uranium project came on the day following the Germany Army's entry into Paris. On June 15, the President

established a new committee for the correlation of the scientific efforts of the country concerned with problems of national defense and placed that committee under the chairmanship of Dr. Vannevar Bush, President of the Carnegie Institution of Washington, whose name I have mentioned in the course of my discussion here. This committee included representatives of the Army and Navy and distinguished scientists and, initially, was to be attached to the Council of National Defense, in keeping with the suggestions I had made.

Accordingly, the President advised Dr. Briggs on June 15 that "since the problem on which you are engaged is part of this larger picture," Dr. Bush was requested by him to take over the uranium project and to reconstitute the committee.

Now, I make my summary: Thus was found a larger framework in accordance with the tenor of the speaker's recommendations. Dr. Bush's committee after our entry into the war became the Office of Scientific Research and Development. Associated with him and with Dr. James B. Conant, of Harvard, was the General Policy Committee, which included the then Vice President, Henry A. Wallace, Secretary of War Stimson, Gen. George C. Marshall, and Army and Navy representatives. The other group of the Army came in 1942.

The uranium project as initially presented by Dr. Einstein and the speaker in October 1939, having by the spring of the next year been reported on favorably by the testing and coordinating committee that the President had appointed under Dr. Briggs' chairmanship, was thus launched on a permanent and progressive career in the wake of our decision after the fall of France to embark on expanding defense.

From then on it became invested with the importance, the resources and the secrecy available to the Government of the United States in defense and later in war for the translation of an idea into a reality and into an instrument of national policy in war and peace.

The CHAIRMAN. Thank you very much, Doctor.

A GENERAL ACCOUNT OF THE DEVELOPMENT OF METHODS
OF USING ATOMIC ENERGY FOR MILITARY PURPOSES
UNDER THE AUSPICES OF THE
UNITED STATES GOVERNMENT
1940 - 1945

by H. D. Smyth

Chairman of the Department of Physics
of Princeton University
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Written at the request of Major General L. R. Groves
United States Army. Publication authorized as of
August 1945

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PREFACE

The ultimate responsibility for our nation's policy rests on its citizens and they can discharge such responsibilities wisely only if they are informed. The average citizen cannot be expected to understand clearly how an atomic bomb is constructed or how it works but there is in this country a substantial group of engineers and scientific men who can understand such things and who can explain the potentialities of atomic bombs to their fellow citizens. The present report is written for this professional group and is a matter-of-fact, general account of work in the United States since 1939 aimed at the production of such bombs. It is neither a documented official history nor a technical treatise for experts. Secrecy requirements have affected both the detailed content and general emphasis so that many interesting developments have been omitted.

References to British and Canadian work are not intended to be complete since this is written from the point of view of the activities of this country.

The writer hopes that this account is substantially accurate, thanks to cooperation from all groups in the project; he takes full responsibility for such errors as may occur.

H. D. Smyth

July 1, 1945

Cover
File with Reference

August 10, 1945

Dear Mr. Secretary Wallace:

Owing to the death of President Roosevelt and his military aid, General Watson - who was the liaison in the early phases of the atomic bomb project - the momentous Statement on the subject by Secretary Stimson unwittingly contains a large gap in respect to the very inception and the early but arduous development of the project until the right framework for that and cognate projects was evolved in concordance with suggestions that emerged from the initiators.

What lies behind the opening sentence of Part II of Secretary Stimson's statement is that Dr. Albert Einstein and the writer sought from August through September 1939 to indicate to the President the potential bearing of the uranium research that was being conducted in Germany and in the Democracies on the defense of civilization in the course of the expected unfolding of Nazi aggression. A presentation was made by the writer in behalf of Dr. Einstein and himself at the White House on October 11, 1939, and in the wake of that the President appointed General Watson as liaison.

It was at that point that the scientific division of your present Department was brought in by the President as the organ for evaluation and decision on the advisability of governmental concern with and fostering aid to the development of the uranium research and its applications to national defense. Dr. Lyman J. Briggs, Director of the Bureau of Standards of the Department of Commerce, was designated by the President as Chairman of a committee which included representatives of the Army and Navy and a public group consisting of Dr. Einstein, Dean Pegrum of Columbia, and the writer.

As co-initiator with Dr. Einstein and as catalyst for the mixed governmental and university groups in the combination, I have kept a sort of multiple-entry bookkeeping record on the exchanges of correspondence, and effected syntheses of the progress of thought as well as work on the uranium project. The record was thus fused with the reactions and the consequential reshaping of the project with a view to the fulfillment of the national purpose that inspired the President and his advisors.

Mindful then of the importance for American history of the very historic record that was a confluence of interest, thought, and labor of the President and the small group that worked on the problem, I felt it incumbent on me to provide forthwith a fully documented history of the project from its inception up to the establishment in mid-1940 of the new and larger vehicle for the promotion and application of scientific research for national defense.

Accordingly I am submitting herewith - for yourself as Secretary of Commerce, for the White House in memory of the direction which emanated from the Presidency and part of the secretariat, and for Secretary Stimson, whose Department, aided by the Policy Committee on which you served, had the general direction of the applications of the project to military operations - copies of this report:

**"Early History Atomic Project in Relation to
President Roosevelt, 1933-40"**

(27 pages and a score of exhibits).

This report not only throws light on the origins of the projects that are passed over in the report of the War Department issued to the public, but it throws important light in the course of the analysis of this crucial laboratory case on the role that should be accorded to Government in respect to the interrelation of dynamic science and national welfare.

I trust that this report will be useful for the needed historical supplementation as to the respective roles played and services rendered by the late President and his advisors within and outside Government in the early and so decisive phases - considering the narrowness of time span and the magnitudes of the issues - of the translation of academic ideas into a weapon of war and prospectively an instrument of peace.

With high regard and a cordial salute,

Yours sincerely,

(signed) Alexander Sachs

Hon. Henry A. Wallace
Secretary of Commerce
Department of Commerce
Washington, D. C.

September 6, 1945

Dear Mr. Secretary Wallace:

In view of the projection in the press and the ferment in Governmental circles of issues revolving around the control of the use of atomic power, may I supplement my transmittal to you of August 23rd by submitting the following series of observations.

I.

1. Our first concern is with the already articulated and rightly emphasized warnings against the exploitation of the atomic bomb as an instrument of divisiveness among the survived triad of hegemonous powers. No wonder that the former isolationists are resuming their old ostrichism and expect that technology can be made a piece of monopolistic autarchy! Actually, of course, such divisiveness and autarchism by the English-speaking world would be the surest means of throwing away victory. The only rational alternative which we not only must demand of our leaders but have a right to attribute to them as inherently desired by them is that the atomic bomb be made the reserve power of the international police for making a reality of the World Security Council.

Considering the portentous magnitude and implications, it would seem to me desirable to project the idea that the Security Council select a major island, say in the Pacific, as a joint possession of the new World Organization wherein experimental plants be located for manufacturing the supplies. This in turn is to be entrusted to a new combined Chiefs of Staff functioning for the World Security Council and the World Organization.

Let me pause to underline the concept of the reserve force on what I deem to be an available illuminating analogy with gold reserves. The historic gold standard, despite certain crude popularizations, did not imply a reduction of all values to the basis of gold. Rather, it admitted the pluralism of economic values in the world - from commodities to capital goods, from tangibles to intangibles, from physical constructs of earning power to securities and all sorts of derivative and symbolic pecuniary claims and rights. But gold was made an interconnecting function of the complex variables of values and was a sensitive instrument of control for signalling and releasing appropriate adjustments when the interrelations between values were on the verge of becoming unbalanced. Correspondingly with respect to the instruments of coercive force subsumed under the general term of military weapons, thinkers with a penchant for over-

simplification are trying to repeat now what they did in the early part of the war in negating the value of all weapons but one. At that time, as will be recalled, they were glibly and verbally destroying naval power and military power in favor of omnivorous air power. So now they are asserting that tanks, and armies, and naval bases will become wasting weapons and liabilities as against atomic power. As opposed to this vast and growing school of speculation, I submit that a more appropriate and promising concept is that atomic power as a military weapon should be developed and held as a reserve by the triad of hegemonous powers in trusteeship for the World Organization.

2. From the foregoing military or peace-enforcement aspects we should turn to an underlying human-welfare aspect that guided the physicists who were the first to discern the manifold potentialities of atomic disintegration. In my original submissions to the President of October 11, 1939 it was stated that the new development held out the following prospects:

- "1. The creation of a new source of energy which might be utilized for purposes of power production;
- "2. The liberation from such chain reaction of new radioactive elements, so that tons rather than grams of radium could be made available in the medical field;"

In pursuit of these more intrinsic ends of human life - what we will do with our security - it would seem to me appropriate to project the idea that while the reserve force be under central control, the diversified economic and humanitarian applications be made accessible to scientists throughout the world. We may even envisage the possibility of the World Organization treating the basic resource and process as a patent monopoly and that royalties accrue to the World Organization from licenses granted for experimentation looking to and exploitation of eventuating developments in technology and medicine and the like.

II.

The story by Bert Andrews in the Tribune of August 27th regarding Presidential insistence on bomb secrecy calls for comment not only on the policy itself but on the relation between that policy and the foregoing constructive proposals.

While the story is put in categorical form, I would still deem it highly improbable that present or, rather, the eventuating policy would be one of extreme nationalism. In the original announcement of President Truman, it was indicated that it was intended to place the development under international control. Since we and the British Commonwealth are already parties to the development, the term "international control" must imply the inclusion of Soviet Russia

and thus constitute the World Security Council as the control authority. It is difficult even to entertain the notion that upon reflection we would not convert into a virtue the probability that the scientists of other nations possessed of ample resource and organization would in the course of time rediscover the process by which the bomb was produced and detonated. As one whose association with the problem dates far back and as one who has some attunement to the logic of scientific discovery, I would hold that the decisive stage was the emergence from the researches of Drs. Sillard and Fermi in the spring of 1939 of a near probability of a chain reaction involving fast neutrons. The releases of the War Department and the imminent publication of Dr. Smyth's report provide a rough but nonetheless persuasive blueprint for the translation of ideas into facts.

Accordingly, the major problem confronting our Administration and our associates is the devising of a proper organizational framework adjusted to the triune needs and utilities of a peacetime world, to wit: (1) as a military weapon, (2) as a source of power and as a transformer of technology, and (3) the humanitarian-medical uses.

The organizational framework now looms forth as decisive as it did in the period following the success of the graphite experiment at Columbia in the spring of 1940 and the admission by the Governmental committee appointed by President Roosevelt that large-scale experimentation would stand a chance of success and was therefore deserving of Government support in the interests of national defense. My contemporaneous memoranda threw into sharp relief the decisive choice of the period - namely, between the leisurely bit-a-bitarian procedure of dispersed university experiments and tense and coordinated large-scale experimentation. Now the choice is in a converse direction. If the research from here on remains under the control of the Army, then the military use will set the tone for the others and will come to throttle the independence and initiative which, operating through a pluralism of sources, make for those novelties and mutations in human thought that give us the great discoveries.

On the subject of organizational media, it is the cultural and economic historians who may have more to contribute than the mere military and business administrators. The cultural historian may offer a recollection that can be transmuted from a warning into a constructive lead. The sixteenth century mathematician and inventor, John Napier, had, as was characteristic of the Renaissance Worthies, a diversity of aptitudes and interests and an attitude of free movement between the theoretical and the practical. Not content with the invention of logarithms and instruments of measurement, he sought to be useful to the cause of freedom and Protestantism in the critical era and the challenge represented by the Armada invasion. Among his works are found suggestions of a primitive tank and reflexive burning mirrors. It is even recorded by him that on finding that one of his devices succeeded in destroying a whole flock of sheep from a considerable distance, he decided to destroy the details regarding this invention,

fearing that mankind could not be entrusted with such a lethal power.

Now the plain deliverance of the history of technology and of culture is that though wars and the needs of wars were the matrix of technical inventions, the intervening periods of peace enabled us to change the swords into plowshares. The historical stimuli, conditions and causes of the transformation were (1) expanded knowledge and freedom of thought, (2) religious toleration and extension of social interchange, and (3) last but not least, the economic system of progressive capitalism. Applying this to the instant issue and evolving situation, it is necessary to seek to discern a far larger scope for atomic energy than that implicit in the contemporaneous guesses as to the potential displacement of this or that fuel or energy within the existing system of economic organization. From the vantage point of cultural-technological history, a major source of new power enlarges the physical geography and transforms the sociographic complex along the dimension of depth. What have remained the desert areas of the world and the sterile spaces are related to the inadequacies and inaccessibilities of water and energy resources. In the light of the reflections given in certain exhibits connected with the formative stages of the project, it is reasonable rather than speculative to say that new worlds will open up, as that the existing world will be enriched. The areas from the Sahara to the Arctic, from the jungle to the arid, will in the course of a time that we can control be transformed by the lifting of the deep-lying water and by making accessible power and heat.

In view of time and other limitations under which I am laboring, the foregoing ideas cannot now and in this place be adequately developed. But they do serve to link up the need not only for a world basis but of a more flexible public vehicle for directing the exploitation of atomic energy. Specifically and pointedly, while the military use should be focalized in the World Security Council, with the civilian experts as auxiliary, the economic and humanitarian uses should be made the readier of access to industry and scientific bodies of all nations coming within the orbit of the World Organization.

Sincerely yours,

Hon. Henry A. Wallace
Secretary of Commerce
Department of Commerce
Washington, D. C.

Chron
11/3-18/45



WASHINGTON, Nov. 28.—(AP)—TELLS OF F. D. R.'s INTEREST IN ATOMS—Alexander Sachs of New York City (left), economic adviser and consultant, talks with Maj. Gen. L. R. Groves, chief of the United States atomic bomb development, at a hearing before the Senate atomic energy committee. He said F. D. R. had advised atomic research in 1939. General Groves advised this country Wednesday to build up an adequate stockpile of atombombs before closing down the three big plants devoted to their manufacture. —A. P. Wirephoto.

'No Defense' Against A-Bomb, Groves Warns

Houston 11/29/45

By ROBERT V. JOHNSON
Post Washington Correspondent

WASHINGTON, Nov. 28.—(Sp)—The man who directed the construction of mankind's most awesome weapon said flatly Wednesday there is no defense against it and no encouragement of any defense being perfected at any time soon.

"No encouragement, period," he reiterated.

He is Maj. Gen. L. R. Groves, head of the Manhattan engineers project of the war department, which developed the atomic bomb.

A big man, calm but emphatic in speech, General Groves gave his views on atomic bombs and atomic energy to the special committee of United States senators who are studying the problem of what to do with atomic energy, now that we have it, and how it may become a blessing, rather than a scourge.

Senate committee hearings come and go, but tomorrow's historian, if the world has a tomorrow, will may deem this one the most important ever conducted. The 11 senators will not, of course, have the final say on atomic energy, but their recommendations almost certainly will have great weight with their colleagues of Congress.

The 11 men who have assumed the responsibility for the recommendations are Brien McMahon of Connecticut, chairman; Tom Connally of Texas, Millard E. Tydings of Maryland, Warren R. Austin of Vermont, Arthur Vandenberg of Michigan, Edwin C. Johnson of Colorado, Harry F. Byrd of Virginia, Thomas C. Hart of Connecticut, Eugene D. Millikan of Colorado, Bourke B. Hickenlooper of Iowa and Richard B. Russell of Georgia.

There are both Democrats and Republicans among them, but the study is strictly non-partisan. The feeling is that an enemy's atomic bombs would wipe out Democrats and Republicans alike.

The trappings of big time Senate hearings were present in the committee room. Motion picture and still photographers recorded the scene in pictures. Two or three dozen news reporters and special writers described it for the world's press. So far there has been scant levity. No one sees anything funny in the atomic bomb, and less so after General Groves gave his testimony.

He spoke for nearly two hours. First he read a prepared statement in which he urged the establishment of a special commission to control further development of atomic energy and then he answered questions from the senators at their raised U-shaped committee desk.

He retold the story of Hiroshima and Nagasaki. There were between 15,000 and 120,000 killed at Hiroshima and between 75,000 and 200,000 injured. Nagasaki's toll was be-

tween 40,000 and 45,000 killed and approximately 40,000 injured. The destruction in the bomb area was complete; nothing lived and scarcely anything stood after the two detonations.

Apt Illustration

The Pentagon building, world's largest, made apt illustration for the Washington-minded senators. Drop one bomb in the center and there would be no more Pentagon, General Groves said. If one were dropped in the heart of the government building area of the city, only a few unusable walls would be left, he added.

Senator Austin brought up the question of radioactivity remaining at the scene of the explosions, to injure rescue workers. "There is none, and that is a very positive none," General Groves replied. Adding that for best effect the bombs are exploded in the air, and for that reason none remains. When the first test bomb was exploded at 100 feet in the air in New Mexico, he continued, there was residual radioactivity for a time, but it was not serious.

"But I wouldn't care to sit down and make my home there," he added, provoking one of the few laughs of the day.

Cow Hair Stories

The senators inquired about news stories that the hair of some cows had turned gray.

"The cows had gray hair," he admitted, "but that was the only effect."

The general said that those who tested the bomb were most impressed by the great light of the explosion. They were, he said, dumbfounded by it. Observers 27 miles away who forgot in their excitement to don welders' helmets were blinded for two or three seconds by it. The general himself lay on the ground, face downward, 10 miles from the explosion and turned to watch it through dark glasses a fraction of a second after the detonation.

At this point he was asked whether he thought the bomb was the deciding factor in the defeat of Japan.

"I think Japan lost the war at the battle of Midway," he replied, "but the people didn't know it."

General Unimpressed

General Groves seemed to be unimpressed by proposals to control the manufacture of atomic bombs by an international inspection force. He pointed out some of the difficulties, as he saw it, by saying that every factory and every home over the world would have to be subject to thorough inspection at any time. Business secrets, therefore, would be open to inspection by inspectors primarily loyal to other countries.

Peacetime uses and war uses of atomic energy cannot be separated, he said. Plants producing peacetime atomic energy could be changed over to war use in a few minutes.

Senator Hickenlooper asked the question on whether there is any encouragement that a defense will be perfected in the reasonable future. "I know of none, unless you can stop the carrying vehicle," General Groves replied. "And it isn't sufficient to stop some of them. You could detonate them with high-powered anti-aircraft. But some would get through."

'No Encouragement'

"So there is no encouragement, period?" Senator Vandenberg asked.

"No encouragement, period," General Groves agreed.

The question of what would happen if an enemy attacked this country first with atomic bombs came up.

General Groves said he did not think it would be a "push button" war, but that this country would suffer severely in the early stages. It then would be up to us, he said in effect, to shower the enemy with more bombs.

Continued development of atomic energy under government supervision is essential to avoid national suicide, he said.

The hearing will continue Thursday, with Dr. Harold Urey of the University of Chicago, winner of the Nobel prize for physics in 1933, as witness.

Roosevelt For 'Action' in 1939 On Atom Study

First Witness at Senate's Atomic Energy Hearings

Senators Hear Economist Who Brought Scientists' Views to White House

WASHINGTON, Nov. 27 (AP).—The Senate Atomic Energy Committee heard today that the late President Roosevelt called for "action" in October, 1939, on the research which produced the atomic bomb.

The statement came from Alexander Sachs, first witness in a series of public hearings, expected to lead to legislation for control of domestic development of nuclear energy.

Mr. Sachs, a New York economist, testified that he acted as a liaison man between a group of physicists—including Albert Einstein—and the White House. He said the scientists asked him to do so "because they had heard I was in a position to talk to the President." He explained that he had advised Mr. Roosevelt on electric power matters in 1936.

Eventually, he said, he came to advise the President on various other matters, including not only the atomic bomb but "strategy." He said he did his advising "without any label" and claimed no official position at the White House.

A big man with a fringe of hair around a bald head, Mr. Sachs spoke rapidly and with hardly a moment's pause for nearly two hours. He brought two big black notebooks and flipped through them incessantly, citing a letter here, a memorandum there.

He said the President had told him he would have to serve as a kind of historian for the atomic project, as White House aids had too many other duties.

Mr. Sachs told the committee he formerly served as an economic consultant for Lehman Brothers, New York bankers, but withdrew from that position when his work with the scientists began to take most of his time.

His voice began to fade as he approached the end of his testimony, but he never took time out for a drink of water.

The "zig-zag" trail which led to the spending of more than \$2,000,000,000 and the blasting of Hiroshima and Nagasaki passed through the White House Oct. 11, 1939, Mr. Sachs told the Senators. It was then, he said, that he informed Mr. Roosevelt of the work done by Drs. Leo Szilard and Enrico Fermi toward splitting the uranium atom.

Mr. Sachs said he told Mr. Roosevelt of German experimentation and that the Nazis had embargoed the export of uranium



Herald Tribune—Acme
Alexander Sachs, left, New York economist, conferring yesterday with Senator Brien McMahon, Democrat, of Connecticut, chairman of the special Senate committee on atomic energy control. Mr. Sachs was the first witness when the committee started hearings yesterday.

from Czechoslovakia after seizing that country. After the conversation, he said the President called in his secretary, General Edwin M. Watson, and told him: "This needs attention."

"Its potentialities were very much in the mind of the President," Mr. Sachs said. "He said, 'don't let Alex go without seeing me again.'"

Mr. Sachs said he left the President a letter from Dr. Einstein describing developments to date and urging that research work be pressed.

In opening the hearing, Chairman Brien McMahon, Democrat, of Connecticut, predicted that atomic energy will affect every phase of life and declared that no time must be lost in dealing with the problem of control.

Major General Leslie Groves, head of the super-secret Manhattan project, is due to testify tomorrow. He will be followed by Dr. Harold Urey and other scientists.

SPOKE OF ATOM TO ROOSEVELT

Sachs Tells Committee of Talks Late in 1939.

Washington, Nov. 27 (A. P.)—

The late President Roosevelt became interested in the possibility of an atomic bomb as early as the autumn of 1939, a witness declared today in the first open hearing of the Senate Atomic Energy Committee.

The witness, Alexander Sachs of New York, said that he carried the news of the latest scientific developments to the President. He said Roosevelt became very interested in the latent possibilities of nuclear fission.

After the conversation at the White House October 11, 1939, Sachs said Roosevelt called in his secretary, Edwin M. (Pa.) Watson and told him: "This needs action."

Sachs, describing himself as an economic adviser and consultant, declared he served as an advisor to the President on various matters without any label.

Sachs said he long had been interested, as a layman, in theoretical physics and was a friend of numerous scientists, including Dr. Albert Einstein. Acting as their spokesman, he arranged to apprise the President of the latest developments in uranium experiments.

Urged Development

He said he informed the Chief Executive "that I was convinced there was sub-atomic energy all around us and that it was our job to develop it, and see that it was not all used to blow our neighbors up."

He then quoted the President as having said:

"Alex, what you're after is to see that the Nazis don't blow us up."

It was then, Sachs said, that Roosevelt called in Watson.

Sachs said the potentialities of the atomic bomb were "very much in the mind of the President" and that he left with him a copy of a letter written by Einstein on the subject August 2, 1939.

Einstein's letter described the new phenomenon which had resulted from recent experiments, and said he suspected uranium could be turned into a new source of energy in the near future. The refugee scientist recommended that American experimental work in the field be speeded up.

To Proceed Slowly

Senator McMahon (D. Conn.), committee chairman, said today that the committee intends to proceed slowly in an effort to insure "that atomic energy becomes a blessing to mankind and not a scourge."

Russia has acknowledged receiving the American-British-Canadian declaration on the atomic bomb, the State Department formally said today, but has expressed no views on it.

Roosevelt Envisioned A-Bomb in Fall of 1939

WASHINGTON, Nov. 27 (AP).—President Roosevelt became interested in the possibility of an atomic bomb as early as the Autumn of 1939, a witness declared today in the first open hearing of the Senate atomic energy committee.

The witness, Alexander Sachs of New York, said he carried news of the latest scientific developments to the President, including the latest possibilities of nuclear fission.

After a conversation at the White House Oct. 11, 1939, Sachs said Roosevelt called in his secretary, Gen. Watson, and told him: "This needs action."

Sachs described himself as an economic consultant who served as an advisor to the President on various matters "without any able."

He said he informed the Chief Executive "that I was convinced there was sub-atomic energy all around us and that it was our job to develop it and see that

it was not all used to blow our neighbors up."

He then quoted the President as having said:

"Alex, what you're after is to see that the Nazis don't blow us up."

Chairman McMahon (D-Conn.) said his committee intends to proceed slowly to insure "that atomic energy becomes a blessing to mankind and not a scourge."

FIRST WITNESSES AT ATOM BOMB HEARING



Maj. Gen. Leslie Groves (right), head of the atom bomb project, chats with Alexander Sachs of New York (left), advisor to the late F. D. "without any label," and Sen. McMahon, chairman of atomic energy committee, as first hearing gets under way.

Senators Told How Einstein Plea Began Atom Race

Alexander Sachs
Carried Refugees
Warning to Roosevelt

By the United Press.

WASHINGTON, Nov. 27.—The United States entered the atomic bomb race on Oct. 17, 1939, when the late President Roosevelt, convinced that Germany was seeking atomic energy for use in war, told his aide, the late Maj. Gen. Edwin Watson, that "this requires action."

The story of how the United States got into the race was told today by Alexander Sachs, New York economist, to the Senate Atomic Energy Committee headed by Sen. Brien McMahon (D-Conn.).

Feared Consequences

Mr. Sachs said he went to the White House on Oct. 11, 1939, with a letter from Prof. Albert Einstein warning of possible consequences to this country of atomic research then going on in Germany.

Mr. Sachs said foreign-born scientists in this country as refugees supplied Mr. Roosevelt with much of the information which motivated him in throwing this government into atomic research.

Mr. Sachs said such refugee scientists as Dr. Einstein and Dr. Leo Szilard approached him "because I was in a position to talk to the President." They knew that Germany was organized to carry out atomic experiments without stint and were fearful that "the safety of the United States would be greatly endangered."

Embargo Cited

Mr. Sachs testified that Dr. Einstein's letter to Mr. Roosevelt stated that experiments by Enrico Fermi and Dr. Szilard led Dr. Einstein to expect that uranium could be turned into energy.

Mr. Sachs said he informed Mr. Roosevelt that when the Germans invaded Czechoslovakia, they put an embargo on export of uranium from that country.

retical Physics, Princeton University; Professor E. Teller, George Washington University; Dr. Fermi of Columbia University; and Dr. Szilard, then a visiting experimental physicist at Columbia.

The committee met on Oct. 21, 1939, and the discussion, according to Dr. Sachs, developed strong objections that those interested in the political-military implications were much too previous in converting a mere potential into an actual result of research. Hence they urged that the government should leave this project to the universities, which anyhow had evinced active interest.

The Refugees Showed Insight

Dr. Sachs testified that the atomic problem teetered between a group of scientists and officials, on one side, who felt that it would take some years before the practical national defense aspects of the problem could be brought to a usable point for the government and the services. On the other side were the refugee scientists, with their insight into the political nature of Europe and scientific developments there, urging haste for the good of America.

While refraining from naming individuals on either side, Dr. Sachs paid due tribute to the leadership of Dr. Briggs, who thought it right for American scientists "to engage in a mental projection from the normal course of research-development to the impact of a mere scientific possibility upon the national defense."

On Nov. 1, 1939, the committee sent the President a report entitled "Possible Use of Uranium for Sub-

marine Power and High Destructive Bombs." They said the project was worthy of direct financial support of the government and recommended the production of four metric tons of pure graphite for immediate experiments which, if successful, should be followed by procurement of fifty tons of uranium oxide.

Early in 1940 Dr. Sachs and Dr. Einstein were dissatisfied with the progress and scope of the atomic project and Dr. Sachs wrote to General Watson, pleading for larger aid that could be based on a favorable evaluation by Dr. Einstein of work then being completed at Columbia University.

In April, Dr. Sachs testified, he was back in the White House with new forebodings of Nazi aggressions and predicting invasions that would deprive the United States of contact with Western Europe. He reported that Dr. Einstein had information of the intensification of uranium research under the leadership of Weizsaecker's son, and that Dr. Szilard's work was proving more promising than Dr. Frederic Joliot-Curie's in France.

Dr. Sachs, a man with fluffy iron-gray hair, who testified with a slight accent, told the committee that the President was encouraging and directed that another committee meeting be held. This

was done on April 27, 1940, and Dr. Sachs testified that it was marked by "further progress in evoking a willingness to entertain consideration of large-scale expenditures that might run up to six figures." But he added that the majority, used to small physical laboratories and small budgets, were not ready for large-scale and comprehensive programs. They insisted, he said, on "bit-a-bit procedures."

The project, which eventually cost \$2,000,000,000, was scaled at this time, the witness said, at \$30,000 to \$50,000 to cover the first stage and the next to cost from \$250,000 to \$500,000. The committee, however, was still thinking of raising funds through a non-profit organization. Although some experiments had already been paid for with Government funds.

ECONOMIST GUIDED EARLY ATOM STEPS

Dr. Alexander Sachs, Before
Senate Group, Reveals His
First Talk With Roosevelt

GERMANS' STUDIES CITED

They Were Stimulating Factor
in Efforts of Our Scientists
to Get the Bomb First

By ANTHONY LEVIERO

Special to The New York Times

WASHINGTON, Nov. 27—The late President Roosevelt listened to a persuasive man in the White House on Oct. 11, 1939, two weeks after Poland was crushed, and got interested in atomic energy. Then with characteristic vigor he brushed aside the hesitations of American scientists and officials, set the atomic project on its irrevocable course and pressed it toward the historic climax that came at Hiroshima after his death.

As the early history of the world-shaking discovery unfolded today before the special Senate committee on atomic energy it was disclosed that an economist, not a scientist, was stage manager of the atomic drama. This economist, the man who drew back the curtain on nuclear fission for Mr. Roosevelt, was the Russian-born Alexander Sachs, who served the President as an informal adviser.

In the near background when the President began to act stood Prof. Albert Einstein. This distinguished physicist read a report of recent experiments a month and a day before the outbreak of World War II and wrote out a prediction of an atomic bomb. He told Mr. Roosevelt that such a bomb, carried by ship, could destroy a port and the surrounding region.

Wants Blessing, Not Scourge

In opening the first session of the Senate "Blue Ribbon" Committee, the chairman, Senator Brian McMahon of Connecticut, said atomic energy might well hold tremendous benefits to mankind, but that the best judgment was necessary to keep it "a blessing to mankind and not a scourge." He added that specific legislation would not be considered until all the facts were known. This was interpreted to mean the Senate committee would disregard the controversial atomic energy control bill, now before the House.

It was Dr. Sachs who told the story about Mr. Roosevelt to the committee, and he handed it his written record of those early events—a record interspersed with scientific papers and letters from and to the White House. Among them was the paper that Dr. Einstein had studied. It was a report by the American physicist, Dr. Leo Szilard, recounting his own experiments and also those of Professor Enrico Fermi, a fugitive from Fascism.

Dr. Einstein and Dr. Szilard were revealed by Dr. Sachs's testimony as the first to worry about the implications for the United States of atomic energy in the hands of a hostile power. Dr. Einstein urged Dr. Sachs to do something, knowing that the economist could get the ear of the President.

So Dr. Sachs went to the President Oct. 11, 1939, with a letter from Dr. Einstein, Dr. Szilard's scientific paper and a memorandum by Dr. Szilard written in every-day language. Dr. Sachs

had been dubbed as the "economic Jeremiah" for his gloomy views and predictions on Nazi power and world destiny in the years between wars. His argument before the President was a worrisome exposition of economic, political and possible scientific forces at work in the world, with the stress on the probability of harnessing atomic force. On this he was able to present what were really nothing more than laboratory intimations of physicists.

After President Roosevelt got through listening to the economic and scientific jargon, he cut through to the heart of the problem in typical language. He said:

"Alex, what you're after is to see that the Nazis don't blow us up."

Then, Dr. Sachs testified, President Roosevelt called his aide, Maj. Gen. Edwin M. Watson, and said:

"Watson, this requires action."

General Watson, the lovable "Pa," as Dr. Sachs described him to the committee, then became an efficient coordinator who was able to keep scientists, civil officials, and military men on the job of developing atomic force.

At one moment of hesitation, when some as yet unnamed early workers on the project thought atomic energy was a rather "remote" thing, General Watson was compelled to admonish them, according to Dr. Sachs. The aide told them: "But the boss wants it, boys."

Scientist and the Bomb

The gist of what Dr. Sachs told Mr. Roosevelt at their first meeting on atomic energy was that Doctors Fermi and Szilard thought it was now possible to obtain a chain reaction from the fast neutrons emitted when uranium is split. By chain reaction they meant the splitting of atoms in series with the explosion of one atom setting off another until a large mass of uranium was converted into terrific explosive energy and heat.

Dr. Sachs also told the President that the Fermi and Szilard experiments were only one step ahead of those of Nazi physicists. Germany had already overrun Czechoslovakia, which had good uranium ore, and Hitler had forbidden its export. The Einstein letter pointed out that the most important source of uranium was in the Belgian Congo and Dr. Sachs added that he predicted the invasion of Belgium and the possibility of losing this source for the United States. That would leave only Canadian uranium for America, he added.

Nazi awareness on atomic energy was attributed by Dr. Sachs to the fact that the son of German Under-Secretary of State von Weizaecker, was a physicist who eventually became head of the Kaiser Wilhelm Institute, and later of the Institute of Physics. The Kaiser Wilhelm Institute, said the Einstein letter, was "where some of the American work on uranium is now being repeated."

Einstein Letter Quoted

In the Einstein letter President Roosevelt read suggestions for government development of atomic energy and this provision of the use of atomic force:

"In the course of the last four months it has been made probable through the work of Joliot in France as well as Fermi and Szilard in America—that it may become possible to set up a nuclear chain reaction in a large mass of uranium, by which vast amounts of power and large quantities of new radium-like elements would be generated. Now it appears this could be achieved in the immediate future.

"This new phenomenon would also lead to the construction of bombs, and it is conceivable—though much less certain—that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port, together with some of the surrounding territory. However, such bombs might very well prove to be too heavy for transportation by air."

The memorandum of Dr. Szilard was in similar vein. Dr. Sachs suggested possibilities for industrial and medical use as well as military use.

As a result of the White House meeting, President Roosevelt told General Watson to bring together Dr. Sachs and Dr. Lyman J. Briggs, the then Director of the Bureau of Standards, and have them form a working committee. This was done, the group being organized as follows:

For the Government, Dr. Briggs, Lieut. Col. Keith F. Adamson of the Army, and Comdr. later Admiral, Gilbert C. Hoover of the Navy; Presidential representative, Dr. Sachs; cooperating scientists, E. P. Wigner, Professor of Theo-

Says FDR First Heard Of Atom Bomb in 1939

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After the conversation at the White House Oct. 11, 1939, Sachs said Mr. Roosevelt called in his secretary, Gen. Watson, and told him: "This needs action."

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He said he informed the Chief

Executive "that I was convinced there was sub-atomic energy all around us and that it was our job to develop it, and see that it was not all used to blow our neighbors up."

He then quoted the President as having said:

"Alex, what you're after is to see that the Nazis don't blow us up."

Chairman McMahon (D-Conn.) said his special Senate committee intended to proceed slowly in an effort to insure "that atomic energy becomes a blessing to mankind and not a scourge."

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McMahon Digging Out Story of \$2,000,000,000 A-Bomb Gamble

Einstein Told FDR How Nazis Embargoed Czech Uranium

By ELIZABETH DONAHUE
Washington Bureau

WASHINGTON, Nov. 28.—The story of how the most dramatic scientific development in the last century—the \$2,000,000,000 gamble on the atom bomb—became a reality in five years is slowly unfolding before the McMahon Special Atomic Committee of the Senate.

Alexander Sachs, an economist with Lehman Bros., New York banking firm, who acted as a go-between in the initial stages of the atomic developments—bearing the news from the scientists to FDR—was the first witness.

Warning his listeners to "bear in mind how narrow has been the time" by which the U. S. won the atomic race, Sachs declared the U. S. had an initial advantage in the "response of freedom-loving scientists of other nations to the call of freedom."

On Oct. 11, 1939, Sachs went to



Sachs

President Roosevelt carrying a letter from Albert Einstein warning that successful atomic developments in Germany posed a serious threat to the U. S. A.

The Einstein letter showed that the Germans six months earlier, when they overran Czechoslovakia, had blocked the export of Czech uranium ores. It also pointed to the danger of an impending Nazi invasion of Belgium which might give the German control of uranium deposits in the Belgian Congo.

Despite FDR's official recognition of the urgent need for developing atomic energy for military purposes, the scientists who first brought the matter to his attention began immediately to sense the bureaucratic opposition which culminated in the recent introduction of the Army's May-Johnson atomic control bill.

Immediately following the meeting with Sachs the President demanded the appointment of a special committee composed of scientists and government officials.

Then came the first bleak period for the scientists who up to then could only predict that if a chain reaction to atom splitting could be achieved, the atom bomb might become a reality.

Meanwhile, between October, 1939, and May, 1940, they worked in oblivion apparently in an atmosphere of official skepticism.

Dr. Lyman Briggs, head of the U. S. Bureau of Standards, was placed on the President's special committee in the Fall of 1939. Subsequently he turned down Sachs' recommendation that the more prominent scientists be permitted to sit on the committee. He

did this in a wire to Sachs dated April 20, insisting that only three scientists and four government officials be allowed places on the President's atomic group.

The official attitude, Sachs told the committee, was one of "conservative hesitation."

A month later, on May 23, 1940, Sachs, convinced that the scientists had reached a crucial stage in their work, wrote FDR's aid, Gen. Watson, that the "matter of uranium is now charged with unpostponable urgencies and require immediate consultation with the President."

Less than a month later President Roosevelt set up the Office of Sci-

entific Research Development headed by Dr. Vannevar Bush.

The Committee headed by Sen. Brien McMahon (D., Conn.) is determined to hear the scientists' side of the whole atomic development and to weigh the pressures and prejudices which reached their climax in the Army's May-Johnson Atomic Control Bill.

Meanwhile, responsible sources on Capitol Hill predict that the current hearings may be suddenly interrupted by the introduction of a new bill that will have the tacit, if not the frank, support of the President and high Administration officials.

Roosevelt For 'Action' in 1939 On Atom Study

Harold Urey 11/28/45
Senators Hear Economist
Who Brought Scientists'
Views to White House

WASHINGTON, Nov. 27 (AP).—The Senate Atomic Energy Committee heard today that the late President Roosevelt called for "action" in October, 1939, on the research which produced the atomic bomb.

The statement came from Alexander Sachs, first witness in a series of public hearings expected to lead to legislation for control of domestic development of nuclear energy.

Mr. Sachs, a New York economist, testified that he acted as a liaison man between a group of physicists—including Albert Einstein—and the White House. He said the scientists asked him to do so "because they had heard I was in a position to talk to the President." He explained that he had advised Mr. Roosevelt on electric power matters in 1936.

Eventually, he said, he came to advise the President on various other matters, including not only the atomic bomb but "strategy." He said he did his advising "without any label," and claimed no official position at the White House.

A big man with a fringe of hair around a bald head, Mr. Sachs spoke rapidly and with hardly a moment's pause for nearly two hours. He brought two big black notebooks and flipped through them incessantly, citing a letter here, a memorandum there.

He said the President had told him he would have to serve as a kind of historian for the atomic project, as White House aids had too many other duties.

Mr. Sachs told the committee he formerly served as an economic consultant for Lehman Brothers, New York bankers, but withdrew from that position when his work with the scientists began to take most of his time.

His voice began to fade as he approached the end of his testimony, but he never took time out for a drink of water.

The "zig-zag" trail which led to the spending of more than \$2,000,000,000 and the blasting of Hiroshima and Nagasaki passed through the White House Oct. 11, 1939, Mr. Sachs told the Senators. It was then, he said, that he informed Mr. Roosevelt of the work done by Drs. Leo Szilard and Enrico Fermi toward splitting the uranium atom.

Mr. Sachs said he told Mr. Roosevelt of German experimentation, and that the Nazis had em-

bargoed the export of uranium from Czechoslovakia after seizing that country. After the conversation, he said the President called in his secretary, General Edwin M. Watson, and told him: "This needs attention."

"Its potentialities were very much in the mind of the President," Mr. Sachs said. "He said, 'don't let Alex go without seeing me again.'"

Mr. Sachs said he left the President a letter from Dr. Einstein describing developments to date and urging that research work be pressed.

In opening the hearing, Chairman Brien McMahon, Democrat, of Connecticut, predicted that atomic energy will affect every phase of life and declared that no time must be lost in dealing with the problem of control.

Major General Leslie Groves, head of the super-secret Manhattan project, is due to testify tomorrow. He will be followed by Dr. Harold Urey and other scientists.



Memo from DR. MELCHIOR PALYI

November 30, 1945

To Mr. Alexander Sachs:
Thought you would like to see this.

*Know we'll
for all be
M. Palyi
L. Palyi*

PRINTED BY H. L. RUGGLES & CO.—PHONE FRANKLIN 0942

Chgo. Tribune
11-28-45

F. D. R. SPEEDED ATOM RESEARCH, SENATORS TOLD

Adviser Tells of Liaison Role for Scientists

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After the conversation Sachs said the President called in his secretary, Gen. Edwin M. [Pa] Watson, and told him: "This needs attention." "Its potentialities were very much in the mind of the President," Sachs said.

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Alexander Sachs

ECONOMIST GUIDED EARLY ATOM STEPS

Dr. Alexander Sachs, Before Senate Group, Reveals His First Talk With Roosevelt

GERMANS' STUDIES CITED

They Were Stimulating Factor in Efforts of Our Scientists to Get the Bomb First

By ANTHONY LEVIERO

WASHINGTON, Nov. 27—The late President Roosevelt listened to a persuasive man in the White House on Oct. 11, 1939, two weeks after Poland was crushed, and got interested in atomic energy. Then with characteristic vigor he brushed aside the hesitations of American scientists and officials, set the atomic project on its irrevocable course and pressed it toward the historic climax that came at Hiroshima after his death.

As the early history of the world-shaking discovery unfolded today before the special Senate committee on atomic energy it was disclosed that an economist, not a scientist, was stage manager of the atomic drama. This economist, the man who drew back the curtain on nuclear fission for Mr. Roosevelt, was the Russian-born Alexander Sachs, who served the President as an informal adviser.

In the near background when the President began to act stood Prof. Albert Einstein. This distinguished physicist read a report of recent experiments a month and a day before the outbreak of World War II and wrote out a prediction of an atomic bomb. He told Mr. Roosevelt that such a bomb, carried by ship, could destroy a port and the surrounding region.

Wants Blessing, Not Scourge
In opening the first session of the Senate "Blue Ribbon" Committee, the chairman, Senator Brien McMahon of Connecticut, said atomic energy might well hold tremendous benefits to mankind, but that the best judgment was necessary to keep it "a blessing to mankind and not a scourge." He added that specific legislation would not be considered until all the facts were known. This was interpreted to mean the Senate committee would disregard the controversial atomic energy control bill now before the House.

It was Dr. Sachs who told the story about Mr. Roosevelt to the committee, and he handed it his written record of those early events—a record interspersed with scientific papers and letters from and to the White House. Among them was the paper that Dr. Einstein had studied. It was a report by the American physicist, Dr. Leo Szilard, recounting his own experiments and also those of Professor Enrico Fermi, a fugitive from Fas-

...SACHS' EARLY DR. EINSTEIN were revealed by Dr. Sachs' testimony as the first to worry about the implications for the United States of atomic energy in the hands of a hostile power. Dr. Einstein urged Dr. Sachs to do something, knowing that the economist could get the ear of the President.

So Dr. Sachs went to the President Oct. 11, 1939, with a letter from Dr. Einstein, Dr. Szilard's scientific paper and a memorandum by Dr. Szilard written in every-day language. Dr. Sachs had been dubbed as the "economic Jeremiah" for his gloomy views and predictions on Nazi power and world destiny in the years between wars. His argument before the President was a worrisome exposition of economic, political and possible scientific forces at work in the world, with the stress on the probability of harnessing atomic force. On this he was able to present what were really nothing more than laboratory intimations of physicists.

After President Roosevelt got through listening to the economic and scientific jargon, he cut through to the heart of the problem in typical language. He said: "Alex, what you're after is to see that the Nazis don't blow us up."

Then, Dr. Sachs testified, President Roosevelt called his aide, Maj. Gen. Edwin M. Watson, and said:

"Watson, this requires action." General Watson, the lovable "Pa," as Dr. Sachs described him to the committee, then became an efficient coordinator who was able to keep scientists, civil officials, and military men on the job of developing atomic force.

At one moment of hesitation, when some as yet unnamed early workers on the project thought atomic energy was a rather "remote" thing, General Watson was compelled to admonish them, according to Dr. Sachs. The aide told them: "But the boss wants it, boys."

Scientist and the Bomb

The gist of what Dr. Sachs told Mr. Roosevelt at their first meeting on atomic energy was that Doctors Fermi and Szilard thought it was now possible to obtain a chain reaction from the fast neutrons emitted when uranium is split. By chain reaction they meant the splitting of atoms in series with the explosion of one atom setting off another until a large mass of uranium was converted into terrific explosive energy and heat.

Dr. Sachs also told the President that the Fermi and Szilard experiments were only one step ahead of those of Nazi physicists. Germany had already overrun Czechoslovakia, which had good uranium ore; and Hitler had forbidden its export. The Einstein letter pointed out that the most important source of uranium was in the Belgian Congo, and Dr. Sachs added that he predicted the invasion of Belgium and the possibility of losing this source for the United States. That would leave only Canadian uranium for America, he added.

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"This new phenomenon would also lead to the construction of bombs, and it is conceivable—though much less certain—that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port, together with some of the surrounding territory. However, such bombs might very well prove to be too heavy for transportation by air."

The memorandum of Dr. Szilard was in similar vein. Dr. Sachs suggested possibilities for industrial and medical use as well as military use.

As a result of the White House meeting, President Roosevelt told General Watson to bring together Dr. Sachs and Dr. Lyman J. Briggs, the then Director of the Bureau of Standards, and have them form a working committee. This was done, the group being organized as follows:

For the Government, Dr. Briggs, Lieut. Col. Keith F. Adamson of the Army, and Comdr. later Admiral, Gilbert C. Hoover of the Navy; Presidential representative, Dr. Sachs; cooperating scientists, E. P. Wigner, Professor of Theoretical Physics, Princeton University; Professor E. Teller, George Washington University; Dr. Fermi of Columbia University; and Dr. Szilard, then a visiting experimental physicist at Columbia.

The committee met on Oct. 21, 1939, and the discussion, according to Dr. Sachs, developed strong objections that those interested in the political-military implications were much too previous in converting a mere potential into an actual result of research. Hence they urged that the government should leave this project to the universities, which anyhow had evinced active interest.

The Refugees Showed Insight

Dr. Sachs testified that the atomic problem teetered between a group of scientists and officials, on one side, who felt that it would take some years before the practical national defense aspects of the problem could be brought to a usable point for the government and the services. On the other side were the refugee scientists, with their insight into the political nature of Europe and scientific developments there, urging haste for the good of America.

While refraining from naming individuals on either side, Dr. Sachs paid due tribute to the leadership of Dr. Briggs, who thought

it right for American scientists engage in a mental projection of the normal course of research development to the impact of a scientific possibility upon the national defense.

On Nov. 1, 1939, the committee sent the President a report entitled "Possible Use of Uranium for Submarine Power and High Destructive Bombs." They said the project was worthy of direct financial support of the government and recommended the production of four metric tons of pure graphite for immediate experiments which, if successful, should be followed by procurement of "fifty tons of uranium oxide."

Early in 1940 Dr. Sachs and Dr. Einstein were dissatisfied with the progress and scope of the atomic project and Dr. Sachs wrote to General Watson, pleading for larger aid that could be based on a favorable evaluation by Dr. Einstein of work then being completed at Columbia University.

In April, Dr. Sachs testified, he was back in the White House with new forebodings of Nazi aggressions and predicting invasions that would deprive the United States of contact with Western Europe. He reported that Dr. Einstein had information of the intensification of uranium research under the leadership of Weizsaecker's son, and that Dr. Szilard's work was proving more promising than Dr. Frederic Joliot-Curie's in France.

Dr. Sachs, a man with fifty iron-gray hair, who testified with a slight accent, told the committee that the President was encouraging and directed that another committee meeting be held. This was done on April 27, 1940, and Dr. Sachs testified that it was marked by "further progress in evoking a willingness to entertain consideration of large-scale expenditures that might run up to six figures." But he added that the majority, used to small physical laboratories and small budgets, were not ready for large-scale and comprehensive programs. They insisted, he said, on "bit-a-bit procedures."

The project, which eventually cost \$2,000,000, was scaled at this time, the witness said, at \$50,000 to \$50,000 to cover the first stage and the next to cost from \$250,000 to \$500,000. The committee, however, was still thinking of raising funds through a non-profit organization. Although some experiments had already been paid for with Government funds.

Dr. Sachs Is an American

Dr. Sachs is an American citizen, having become so in 1940. He was born in Russia and came to the United States in 1921. He is a physicist and a member of the National Academy of Sciences. He has been a member of the Senate committee on atomic energy since its formation in 1939. He is currently a member of the Atomic Energy Commission. He is also a member of the National Bureau of Standards. He is a member of the American Physical Society. He is a member of the American Association of Economic Geologists. He is a member of the American Association of Petroleum Geologists. He is a member of the American Association of Economic Geologists. He is a member of the American Association of Petroleum Geologists. He is a member of the American Association of Economic Geologists. He is a member of the American Association of Petroleum Geologists.

Atom Messenger Boy *Nov 24* By Peter Edson



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The Senate's atomic bomb investigation got off to an awful start Tuesday when a self-styled economic Jeremiah named Alexander Sachs took the witness stand and for two hours refused to let go. In that time he delivered a nonstop lecture on the history of civilization that was far deadlier than any atomic bomb ever concocted.

The committee room was small and crowded. The air was warm. The cigars smoked by Chairman Brian McMahon (D., Conn.) and Sen. Tom Connally (D., Tex.) were strong. Maybe it was the atmosphere and not the first atomic witness's testimony, but in the interests of accurate reporting it must be recorded that toward the end of the proceedings Sen. Connally's lowest chin dropped to his vest and his eyes closed, while Sen. Arthur Vandenberg (R., Mich.) propped his chin in the angle of his thumb and first two fingers and his eyes closed, too. They were concentrating.

Anyway, when the quorum call came for the Senators to get back to the floor of the Capitol at high noon, Mr. Sachs still had five years to go. He had got from his version of Genesis—"In the beginning there was a political concept and a moral concern" up to June, 1940—which marked the fall of Paris to the Germans and the appointment of another committee by President Roosevelt. Chairman McMahon tried several times to stop the lecture, but Mr. Sachs paid no attention and went blithely on, quoting from Exodus, St. John, Clemenceau and the Irish poet, Yeats, and having

fine time. It was his day and he enjoyed it thoroughly whether any one else did or not. Maj. Gen. Leslie R. Groves sat around for an hour, twiddling his thumbs and waiting for his chance to testify, but he never got a word in and was told to come back the next day. Chairman McMahon at the end, getting in the next-to-the-last words, said Mr. Sachs might come back at some later time, to finish his statement, but he wasn't very specific as to when. You'll just have to guess at what happened between 1940 and 1945.

What Mr. Sachs had to do with the atomic bomb never did come out quite clearly, although the modest inference was that it was practically everything.

At one point he said his role was to be a "resonator" to the President's idea. At another point Mr. Sachs said Mr. Roosevelt said to him: "Pa. Watson's going to be too busy to be historian; you've got to be it." At still a third point, Mr. Sachs said he did not hesitate to be a glorified messenger boy. Maybe that's what resonator and historian mean—messenger boy.

Anyway, Mr. Sachs finally admitted coyly, without anyone asking him, that he was the man who carried the first memo on atomic energy from Albert Einstein to President Roosevelt. This was his fame and it rates him right alongside Paul Revere, the fellow whose name nobody can remember, but who carried the message to Garcia, and the three other fellows who brought the good news from Ghent to Aix. Boy, page Elbert Hubbard and two poets.

Mr. Sachs said to the Senators, "You gentlemen are punch drunk from printer's ink." The Senators all laughed at that. Printer's ink isn't the only thing you can get punch drunk on.

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...It was Dr. Sachs who told the story about Mr. Roosevelt to the committee, and he handed it his written record of those early events—a record interspersed with scientific papers and letters from and to the White House. Among them was the paper that Dr. Einstein had studied. It was a report by the American physicist, Dr. Leo Szilard, recounting his own experiments and also those of Professor Enrico Fermi, a fugitive from Fascism.
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WASHINGTON, Nov. 27 (UP)—In response to inquiries Chairman McMahon issued the following statement concerning Dr. Sachs' background:

"Dr. Alexander Sachs, presently economic advisor and industrial consultant, maintains his own offices at 72 Wall Street. Dr. Sachs was vice president and chief economist of the Lehman Corporation, an important investment corporation, during the entire Thirties.

"He predicted the great depression of 1929 and predicted further that the depression would end in the collapse of currency and the gold standard through a succession of bank crises; also that the economic collapse would come with such a rhythmic movement that every country on the face of the earth would become involved. He also predicted the collapse of Germany and the rise of Hitler in 1931.

"Through those predictions he became widely known in international economic circles. It was in this way that Dr. Sachs first became acquainted with the late President Franklin D. Roosevelt.

"In 1933 Dr. Sachs was appointed as first chief economist and organizer of the NRA, and was, thereafter, frequently called upon by the late President in connection with economic problems.

"Dr. Sachs was born in Russia and came to America at an early age. He was educated at Columbia University and Harvard University as well as Cambridge University in England. Dr. Sachs is an American citizen."

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Dr. Alexander Sachs, Before
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By ANTHONY LEVIERO
Special to The New York Times

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Sachs Becomes Paul Revere Of Atom Age

Self-Styled Economic Jeremiah Leaves Senate Committee Bewildered

By PETER EDSON

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"Resonator" Role
At one point Sachs said his role was to be a "resonator" in the President's ideas. At another point Sachs said Roosevelt said to him, "Pa. Watson's going to be too busy to be historian, you've got to be it." At still a third point Sachs said he did not hesitate to be a glorified messenger boy. Maybe that's what resonator and historian mean—messenger boy.

Anyway, Sachs finally admitted, boy, without anyone asking him, that he was the man who carried the first memo on atomic energy from Albert Einstein to President Roosevelt. This was his fame and it rates him right alongside Paul Revere, the fellow whose name nobody can remember but who carried the message to Garcia, and the three other fellows who brought the good news from Ghent to Aix. Boy, says Albert Hubbard and two poets, Sachs is quite a guy, no fooling. Big body, big bald head, crowned by a fringe of gray hair that stuck straight up, like Caesar's wreath. His eyes bulged behind thick-lensed, heavy horn-rimmed glasses. He spoke rapidly, his voice high and at times crackling. He was born in Russia 52 years ago, came to America in 1904, graduated from Columbia and Harvard and became vice president of Lehman Brothers, bankers. Probably in charge of the philosophical window. And don't ever again say big investment houses don't have souls. The soul of Mr. Sachs is as big as history. For a time he was economic adviser to the late Gen. "Iron Pants" Johnson, back in NRA days. This could explain a lot of things but probably doesn't.

Atomic Safety Hinged Upon U. S. Secrecy

WASHINGTON, Nov. 29 (P)—The United States has such a head start in the atomic-arms race, Maj. Gen. L. R. Groves asserted today, that no nation could ever overtake it "for all time to come—provided the rules are the same."

The rules, he told the Senate Atomic Energy Committee, are secrecy." Amplifying, he said: "If they have secrecy and we have secrecy, we'll be ahead."

An entirely different view of an atomic-arms race was presented by Nobel Prize winner Harold C. Urey, a colleague of General Groves in the development of the atomic weapon.

"We are making bombs and storing them," Professor Urey declared, "and thus are a threat to other countries and are guilty of beginning the atomic-arms race. If continued, it will lead to fire disaster."

The University of Chicago Chemistry Professor took the position that atomic bombs must not be made by any country or stored in any place in the world "if we are to have any feeling of security on this all-too-small planet." He urged strict atomic control by the United Nations Organization.

General Groves, who favors continued production of the bombs, said that if the United States should share its atomic knowledge and know-how with the rest of the world, there is a likelihood that other nations will outstrip it "because they'll find out something they won't share with us."

General Groves estimated that

Senators Hear Atomic Story



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Development of Bomb Told at Hearings

Senator Brien McMahon (D) of Connecticut, center, talking with Maj. Gen. Leslie R. Groves, who directed the development of the bomb, and

Alexander Sachs, who told the investigating committee of the rush for perfection of the atomic bomb during the early days of the war.

it might be possible for another nation to produce an atomic bomb within 15 or 20 years if it did so in complete secrecy, although with help from the United States, Great Britain, and Switzerland (for fine machine tools and so on) the time might be reduced to 5 or 7 years

POST

Weekly Picture Magazine SECTION

NEW YORK POST

Man Behind the Atom

By DEXTER TEED

Dr. Alexander Sachs, who convinced President Roosevelt that the U. S. should back atomic energy research, must be rated as a major prophet. He has been predicting with remarkable success for more than 15 years. That is why the man-behind-the-bomb must be listened to when he speaks.

Today he is ready to tell what the discovery of atomic energy can mean to mankind.

"People should realize this is the challenge of our generation," he says. "We have to ponder more on what the discovery of atomic energy means before we can reach solutions. Diagnosis must precede prescribing for the world."

"But for an understanding of the whole international political order no solution is possible."

Sachs, big-bodied, fiftyish, scant hair like Einstein's floating around his head, paces and speaks with feeling.

The entire problem transcends the limitations of nationality. But the mere fact that we drive atomic energy first has prevented the regimentation of science. What if Germany had discovered it first?

World is Richer

With Atom Energy

A nationalistic solution is impossible. Unless we are sure it can be used non-nationalistically, it is not possible. It must be transcendent, transcending the boundaries that heighten the problem of world security.

But there are no simple formulas.

Sachs, a gifted economist, also a student of philosophy and science, talks in technical language. He is exact, precise. Simple words do not become him, for he is not a simple man. But he doesn't have a fear-complex about atomic energy. Translated into non-technical terms, his view of what atomic energy may do to the world of the future can be summed up:

He believes that the existing world will be enriched. Deserts will bloom. Jungles will be made habitable. Poorly developed regions will flourish. Atomic energy, used as a power source,



DR. ALEXANDER SACHS

Post Photo by Gaston

may well accomplish what once was considered impossible. It will draw from the earth the deep water—all in a time that we can control.

But this near-Utopia will not be possible if we don't solve the immediate problem of what to do with the atomic bomb—the most fearful destructive force ever contrived by man.

He believes the bomb should be turned over to an international police force which would operate under Chiefs of Staff of a World Security Council.

He's an American

As Will Rogers

Further development of the bomb as a weapon should be continued—perhaps on an island in the middle of the ocean. It should be used, then, as a weapon to strengthen the control of the existing United Nations Organization.

These views on atomic energy will eventually be elaborated and explained in a long magazine article. Meanwhile, Dr. Sachs works long hours in libraries and in his offices at 72 Wall St. He

member of the Downtown Harvard Lunch Club, he widened his acquaintance and eventually became an economic adviser to private investors. That led to more contacts. Over a period of years he advised government agencies, including the NRA in Washington, and finally he was elected a vice-president of the Lehman Corp., an investment trust managed by Lehman Brothers. He is now an independent economic consultant.

He first met Franklin D. Roose-

Closeup

December 1, 1945

stein and other renowned physicists interested in atomic energy. After Munich he told F.D.R., "The Germans have finished their costless victories and they are masters of the continent."

When 1939 came he quoted Thomas Hobbes (1651), who spoke of the atmosphere of "war weather." The war began soon thereafter and, learning that the Germans had made important advances in atomic research, Dr. Sachs began the series of moves that culminated in an "hour-long" conference with the President, on Oct. 11, 1939. He convinced F.D.R. that the government should back the atomic project. History records the remainder.

"There are evil and good in the atom," he told the President. "Like a split magnet, it has a north and south pole. But we must beat the Nazis in discovering atomic energy."

He was backed in his opinion by Einstein, Dr. Leo Szilard and Prof. Enrico Fermi, a fugitive from Fascism. These physicists, aided by Prof. Eugene Wigner of Princeton, were behind the man behind-the-atom. Today, Dr. Sachs has his own niche in the history of the world.

velt in the fall of 1932 at the Biltmore Hotel and Sachs was immediately impressed with F. D. R.'s "smiling good humor and personal charm." Roosevelt retained him as an adviser on economic matters—and the relationship that eventually produced atomic energy began.

With uncanny accuracy Dr. Sachs predicted most phases of the depression; a period of liquidation of the "international-debt structure," its collapse, going off of the gold standard. He accused the statesmen of the world of being "overtaken by a sort of high-tension paralysis," which was a true prophecy, suggesting imminent political collapse.

As early as 1933 he was the first man in the Western world to predict that the breakdown of the political order would mean war. In that year he talked with F. D. R. about it and, for the first time, mentioned that uranium could be used as a source of atomic energy.

Concurrently, he had attended the Institute for Advanced Study as a guest of Lord Lothian, and eventually he met Albert Ein-

is racing against time. In an attempt to catch up on all possible knowledge that will help to solve the problem of atomic energy. For he is a zealot.

Dr. Sachs looks like any of a thousand business men. He dresses plainly and often wears a light blue shirt, with a dark blue tie. In general, clothes don't mean much to him—except that they are necessary.

He's as American in his outlook as Will Rogers, although he was born in Russia on Aug. 1, 1893. In Russia he lived as a boy, surrounded by people who encouraged scholarship.

When he was 11 his parents came to America and settled in New York. They soon discovered that young Alexander was a gifted student who picked up the language quickly and shot to the top in his classes. He entered Columbia when he was 15 and was graduated four years later. In 1916 he became Francis Parkman Fellow at Harvard and studied philosophy, jurisprudence and sociology—all subjects which broadened his outlook.

His career began in Wall St. A

From:

J. E. Pogue.

the deep, cold waters,
The tragedy, which occurred

12/27/45
**F. D. INTEREST
IN ATOM TOLD**

Dallas Daily Herald

Washington, Nov. 27 (AP).—The late President Roosevelt became interested in the possibility of an atomic bomb as early as the autumn of 1939, a witness declared today in the first open hearing of the senate atomic energy committee.

The witness, Alexander Sachs of New York, said he carried the news of the latest scientific developments to the president.

After the conversation at the White House Oct. 11, 1939, Sachs said Mr. Roosevelt called in his secretary, Gen. Edwin M. (Pa) Watson and told him: "This needs action."

Sachs, describing himself as an economic adviser and consultant, declared he served as an advisor to the President on various matters "without any label."

Sachs said he long had been interested, as a layman, in theoretical physics and was a friend of numerous scientists, including Dr. Albert Einstein.

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November 29, 1945

Dear Dr. Einstein:

As one who has had the privilege of collaborating with you in the evocation of President Roosevelt's interest and aid in the research which culminated in the atomic bomb, and hopefully the applications of nuclear energy to peace and welfare, I take the liberty, after deliberation, to endorse and reinforce the request of the American Nobel Center for your participation in the dinner scheduled for December 10th on "Winning the Peace." Fully realizing how numerous must be the demands upon your time and effort in behalf of causes and how consistently generous your responses have been, I would shrink from even the appearance of pressing you. But this does seem to represent a unique opportunity for making an appeal to the very Powers, Great Britain and the United States, in possession of the atomic bomb and atomic energy discoveries to bethink themselves of their obligation to the Jewish people. For the pyramiding pyre that the Nazis have so triumphantly made of Eastern and Continental Jewry presents the Christian Powers that have emerged victorious with a challenge of Atonement, so that the near vanishing remnant can, through rerooting in the recognized national homeland, become a "saving remnant."

The notable role that Jews have played in first perceiving the danger of Nazi acquisition and then laboring in the task of time-telescoped conquest of the weapon and the power source for the democracies constitutes another symbolic challenge to the major English-speaking Powers, whose moral ideals and political institutions have such deep roots in the religion and culture of the People of the Book.

It is therefore most fitting that you be the one to voice the cause of Jewry and Palestine at this forthcoming dinner and the conviction that the military victory can be translated into peace only if the wrong of the ages be righted.

I need hardly add that everything will be done to spare you all possible strain and burden, - ranging all the way from the physical accommodations of calling for and returning you to your home, up to the prompt submission to you of proposed suggestions and observations - particularly by Mr. Marvin Lowenthal - for inclusion in your talk. If direct attendance is out of the question, then the device that was used by Justice Frankfurter of telephoning his address could be followed.

Please do not hesitate to wire or telephone me (office telephone, Hanover 2-5390; residence 171 West 57th Street, telephone Columbus 5-2773) of your decision and of any ways in which I can be of use in this or in any other connection.

With kind and high regard,

Cordially yours,

ALEXANDER SACHS

Dr. Albert Einstein
Princeton, New Jersey

Ch...
Consep.

September 21, 1945

Dear Mr. Secretary Wallace:

There are still further reflections that I have accumulated during my vacation on the problems presented by the discovery and applications of nuclear energy that seem to me starred with an interest and value pertinent for the crucial and grave decisions that will have to be made by this Administration. It is in that thought that I beg leave to submit them to you.

1. First and foremost, the general concept of America's responsibility for evolving a right long-term policy for the use of the military weapon as an instrument of peace enforcement gains sharpness and emphasis by relating it to America's origination of the Kellogg-Briand treaties. That leadership in the renunciation of aggressive warfare as a political weapon places us in an anomalous position with reference to the possession and use of a weapon that is the archetype of aggression and surprise. Justice Jackson, as our representative on the war criminals trials, has given a new life and significance to the Kellogg treaties by making them the legal foundation for the trial of the participating leading factors in the war of aggression unleashed by Germany.

The totalitarian weapon of the atomic bomb presents manifold dilemmas, particularly to the United States as a democratic power with a definitely civilian-minded citizenry that has not yet acquired the habits of mind and the structure of institutions corresponding to and requisite for its weight and importance in the complex of material, military and correlative powers. The totalitarish weapon did not grow directly out of the nature of totalitarian war. Rather, as is implicit through the subdued presentation of my historical narrative of the inception and early history, the atomic bomb, which was barely completed this summer and thus contributed to foreshortening the war by the order of half a year, could not have been translated into reality, but for an act of organized political foresight on the part of politically-minded physical scientists and scientifically-minded social and economic scientists. Through this fusion and mediation, the (great) President at the helm of the United States perceived the potentialities; and after two-thirds of a year of the kinds of delays - due to the intractability of institutional habits - that might well have proved fatal, the trio of political-physicists and scientific-politicians influenced the great statesman to establish a framework and a pace of operation for the prosecution of the project that led to success.

Now, it is this fundamental summary of what had taken place that must be placed in the perspective of the American and the western democratic processes. The very representative democratic institutions of the western democracies have, in respect to the use of instruments of aggression, combined with surprise, been at a disadvantage over against countries ruled by unitary executives that do not require advance consultation with and debate by representatives and diverse and divergent elements in the body politic and social.

Jumping intervening steps, your "illative" mind - to use Cardinal Newman's expression - will reach the conclusion that the totalitarian character of the new weapon threatens to obliterate the opportunity for the time-borrowing inherent in defense, and by imperilling the democratic institutions, with their delays and deliberations, renders imperative the task of making the weapon safe for us. That safety can only arise through a social invention involving a trans-national organization for the use of power as a reserve force, along the lines of my initial exposition to you.

2. Renan's remark that he wished he could write in polychromatic ink to encompass the qualifications requisite for certain statements, - that remark is particularly pertinent to the reaction voiced by some concerned with spiritual and moral values that the atomic bomb is a new danger to the human race. As against that, I would hold that the correct view is that the bomb is but another, albeit highly crucial, instance of the eternal ambivalence and conflict in human nature between good and evil. Totalitarian warfare has produced a totalitarian weapon. The peril from the new knowledge comes from the dualism in man's nature, which I need hardly say is the great deliverance and abiding truth of ethical religions. It is an essential condition of our existence that we can use the power of knowledge to destroy ourselves or to redeem ourselves. The new knowledge can lead to a climactic demonstration of what has been called "the soul death when a man's darkness comes from his own light."

But on variable scales of extent and potency this has obtained ever since man, in fulfillment of the divine urge within him, has been the inventor and the user of tools that he fashioned and of the resources of nature that he uncovered and redirected in spatial and temporal positions. Gunpowder was discovered and used not only for the destruction of man, but also for the blasting of rocks. The telescope has been a war weapon as well as the unveiler of the heavens. It has been the tool by which commanders have extended their vision and thereby the areas of military operations. It, like all the other instruments of vision, has aided navigation and the opening up of continents.

The list can, of course, be extended indefinitely all the way from the axe - for converting materials to human use, or for hacking

human bodies to pieces - to steam, gas and electric power, to telegraphy and telephony, radio and radar. Going back over a half century in the social-technological applications of an invention made a half-century earlier, when manufactured gas from coal was placed in homes and gas mains were spread through cities, a mere turning of a tap or tampering with the mains would enable an evil person to deal destruction to single or numerous individuals and small to extensive areas.

What has happened since is that we have come closer to the most fundamental of the secrets of nature. As a result, the very integration of the use of those secrets into the human and social fabrics of a technologically interconnected world has raised to a sort of nth degree the scope for evil and at the same time the scope for good. Safety devices have come along with inventions, but no safety device is fool-proof or evil-proof. In sum, then, the discovery and the use of nuclear energy is no new moral or spiritual problem - that is, no problem that in principle has not already existed in the use of material and mechanical resource and electronic energies.

5. There is another point of special import for those concerned with the right and moral use of power. The bringing of the researches on atomic power to what in the light of past patterns must be regarded as a premature birth itself shows the limited validity of the conventional distinction and controversies over pure vs. applied and the so-called disinterested vs. socially directed scientific research. In this connection, I would direct your attention to the enclosed clipping which condenses the Smyth Report. In the opening parts it is shown that the refugee scientists felt earlier and far more keenly than the native American scientists the need of prosecuting the research with vigor and speed. This gains sharpness from the account of the inception that I have myself given. The role played by my memorandum of March 10, 1959, which I am resubmitting herewith, may be summed up under this head: In the beginning was a political-ethical purpose evoked by the individual who played the part of intermediary for the scientists, for which end he made them the more articulate and provided the proper mis-en-scene for an effective presentation of the idea to the President. As Drs. Einstein and Szilard and the writer had a kinship of outlook and concern about the future of the world, it may be said with literal accuracy that in this respect they were political moralists first and scientists and economists second.

4. While space and time are lacking to develop this theme, it points the way to a reorientation on the traditional dichotomy between pure and applied science. The more one goes into the human histories of the leaders in the van of medical, scientific and related progress, the more it is borne in upon one that the great scientific advances

in western civilization, in contrast with the limited character of ancient science, may to a considerable extent be due to the intervening spiritual and religious progress made by humanity. Even in the case of the self-styled agnostic scientists, their work could not have taken place but for the prior religious tradition and the accumulated cultural institutions inspired by that tradition.

As one who has made researches - even though not yet set down in published form - on the generative role of religious and cultural forces in and upon the course of scientific and social institutionalisms, I believe that, given time and opportunity, a cogent and indeed irrefutable case can be made out for the following theses:

- (a) As against the earlier conventional histories written in terms of conflicts between religion and science, or laterally between capitalism and social welfare, western civilization as it has taken form since the Renaissance and the Reformation has been molded and impelled by a uniquely variable and progressive synthesis of the transmitted and even transformed Christian-Hebraic-Hellenic traditions.
- (b) As against the view of conventional historians that accord exclusive credit for science to the Hellenic tradition, I submit that our civilization's transcendence of the cleavage between the theoretical and the practical, the ideal and the actual, and the correlative cleavages in Hellas between classes and acquiescence in our institution of slavery, - this transcendence is due to the religious tradition and inspiration and the correlative discontent with the so far attained progress in translating ideals into reality. It is significant that the other religious traditions that have been operative in the world - from Buddhism, Shintoism to Confucianism, and to a large extent, Mohammedanism - have only in rare exceptions been similarly motivated and sustainedly directed; and in those exceptions interaction with Christianity and the Hebraic tradition; through the rediscovery and restudy of the original Bible, have played an influential role.
- (c) The scientist-type of individual differs from the philosopher and the priest types of antiquity and the corresponding types of non-western civilizations and religions. For, while detached from mundane and practical affairs, he is motivated by the fusion of the theoretical and the practical, the personally contemplative and the community-promotive aims. His dedication is not to the study of nature for nature's sake and the finding of individuals' liberation from the troubles and perplexities of the world, but for adding to the sum total of the union of science and

human welfare that western scientists through the ages have represented as a community of secular saints.

In the light of these fundamental cultural postulates regarding our society, the accelerated development of nuclear energy for practical purposes must be regarded as opening up not merely a new frontier of the mind, but a new frontier on the interrelated fronts of political, economic and social action by and for our progressing civilization.

5. Thus envisaged, the atomic bomb dramatizes the complex of political, economic and educational issues dealt with in the released report of Dr. Vannevar Bush, "Science, The Endless Frontier." The accompanying tabulation based on included data throws into relief the need for making the intertwined pursuit and application of science and technology a more significant and more sustained factor in our national economy. Putting it in concrete terms, before the war total expenditures of all agencies - governmental, private-industrial and public-foundation types - have ranged between 2% and 3% of national income and have shown a tendency, particularly in the industrial allocations, to rise moderately with increased national income. During the war, expenditures under governmental auspices have, of course, risen very sharply and have themselves grown from a level of around 1% of national income in the prewar to 4 $\frac{1}{2}$ % in the year 1944. Even if for the postwar we adopt the optimistic assumption that total expenditures on pure and applied science will aggregate the highest war-governmental expenditures and the highest prewar industrial expenditures, the combination would amount to 6% of the national income in 1944.

Now, the first problem presented to our society by the spectacle of the war-augmented expenditures and the war-induced acceleration of the birth of scientific applications is that a science-minded society needs a sustained upward trend in the investment share of its national income and resources for scientific research and its human applications.

This in turn calls for a revision of some of our concepts of the role of governmental solicitude for long-term national defense and national progress. The moderate and in part unsound, because far from adequate, program of the Bush report and the more sweeping, but in parts unsound, because still inadequate, program of the Kilgore Bill have led to the reemergence of an all too typical controversy on the antithesis of private initiative vs. governmental regimentation. The bemusement with that antithesis has played its part in the neglect of an opportunity to rationalize the Murray Bill. It is based on a sort of secular Calvinism that assumes the total depravity of man's uncontrolled political nature and the abounding grace of man's unregulated

economic nature. A salient instance of that type of thought was the argument of the great Joseph Choate before the Supreme Court of 1895 that the then proposed 2% income tax had "scattered to the winds the great fundamental principle of private property." Current instances of that type of thought are found in the vogue that has been built up among business and banking elements for the far from theoretically valid and the socially dangerous writings of von Mises and von Hayek.

The issue of making scientific research and scientific applications a major instead of a minor factor in our life challenges us to find a way out of such artificial dilemmas by creative thought and action in the realm of political economy for the sake of international peace and sound social and economic progress.

Here endeth the lesson as it may be encompassed in this letter, but still not the whole of the lesson that needs to be articulated in order that our leaders and our people act with that understanding heart and that generous sagacity needed for the present emergency, as it was needed and exemplified in the actions taken by President Roosevelt and the American people in lend-lease to Britain and its extension to Russia, and in the whole great moral strategy of the political conduct of our Allied relations during the war.

Sincerely yours,

Hon. Henry A. Wallace
Secretary of Commerce
Department of Commerce
Washington, D. C.

Comp
Chapin
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October 11, 1945

Dear Mr. Secretary Wallace:

Harking back to your letter at the end of last month, I desire to state that I had hoped that in the course of my visit to Washington in the closing week of the month I might be able to see you in regard to it and cognate matters. I since learned that you were on a trip that included attendance at the closing sessions of the Chicago conference.

In connection with your proposed request for correction of the deficiencies in the reports that have been issued by and under the auspices of the War Department, it would seem to me advisable to allude in summary form to a set of considerations which not only are necessary for providing a correct historical perspective, but also for a correct orientation towards the pressing policies of the present and the future. In the interest of effectiveness of presentation and in recognition of the pressures upon your own time, I will attempt to set forth my conclusions and leave for an accompanying or subsequent memorandum the supporting considerations.

1. The Smyth Report as well as the summary releases by the War Department to the press have relegated to the background and to a very large extent eclipsed the role of the President and his relationship towards (a) the civilian originators of the project and in particular the proponent and spokesman who continued in an advisory capacity to the President, and (b) the civil servants and the civilian agency within Government who aided the effectuation of his policy over a period when representatives of the military Services were initially opposed and later relatively indifferent to the project.
2. The overemphases in these reports on the operational side and on the later stages, which date from 1945, contrast very markedly with the British White Paper entitled "Statements Relating to the Atomic Bomb." The British White Paper devotes the preponderance of its space and attention to (a) the background of the idea; (b) the initiation of governmental concern and the intermediary and catalytic role played by Lord Cherwell, who - apart from the permanent scientific supervisory tasks assigned by Mr. Churchill to him when he was still F. A. Lindemann, the professor of physics at Oxford - was, with respect to

this project, the analogue to the present writer; and (c) the vicissitudes of the project, including the disappointing delays on this side until (d) after the exchanges of missions and our entry into combat war, a pooling of British and American scientific thought and organisational-experimental procedures was effected, leading to (e) the integration of pilot plant and production stages on a magnified scale, - which is the main subject matter of the Smyth and War Department Reports.

The Report's shortcomings in conceptual framework and in content have produced errors of omission and errors of commission. The main consequence of the errors of omission is that the originative ideas and the processes of their adoption are lost sight of and their end-product, the plant construction and outward production, looms so large and springs forth as a sort of emanation from a self-initiated interest of the Services in what was going on in the scientific laboratories. The true history, of course, is quite different: For in the beginning was the idea and the travail to incarnate the idea through the individuals who were infused with the convictions of the President and his advisers.

Notes: In this connection, if and when the time-scope of a full historic report be made to cover the periods from 1939 up to the launching of the plant construction - that is, to encompass the stages beyond the end of the writer's Special Report with the transfer of the project in June 1940 to the suggested and newly organized Committee for Scientific Research and Development - than it would be necessary to include adequate recognition for the contributions made not only by the refugee scientists, but also the contribution by a refugee technologist-businessman, namely Mr. Boris Fregel, who as an associate in Paris of the Union Miniere du Haut-Katonga, had acquired great knowledge and effective skills which, when he came over here, were, according to information that had contemporaneously come to me, placed liberally and efficaciously at the service of the university experimenters and later the governmental agencies.

5. The War Department reports, by their neglect of the origins, the struggle and the travail, leave the impression of a sort of linear progression from 1939 on. The deviation from the actual course of events that that represents could, if this

were the appropriate place, be proved by chapter and verse. All this has a forward as well as backward reaching significance. For the dominant note in my presentation to the President of March 10, 1939 was that it was incumbent upon the United States "to use the time-drafts that still can be made on the Bank of History for the preparedness ... that will become more and more urgent and inevitable for all members of Western Civilization as a result of past errors committed." And prospectively the dominant note that has to be struck is, in the language of my letter to you of September 21st "that the totalitarian character of the new weapon threatens to obliterate the opportunity for the time-borrowing inherent in defense and, by imperilling the democratic institutions, with their delays and deliberations, renders imperative the task of making the weapon safe for us."

4. The desirable fuller and juster picture of the checkered historic career of the project is also necessary for an understanding of the process by which democracy had to grope its way into a proper organizational framework for the effectuation of a task that was utterly unprecedented and beyond the capacities of not only business as such, but also the compartmentalized aggregations of separate and scattered university laboratories, governmental departments and technical divisions of the diverse business corporations.

For the incarnation of the idea into a body corporate, there had to be a realization from the inception - along the lines of the exposition in my memorandum of April 20, 1940 (forming Exhibit 17 of the Special Report) of the new type of organization of unification of activities and human instruments that could transcend the differences in the divisions and could telescope in space and in time what would otherwise have remained dispersed and successive, and thus prevented us from accomplishing the task in time.

Note: In this connection, the services rendered by the Bureau of Standards and Dr. Briggs - notwithstanding the excessive burdens placed upon an understaffed and underfinanced Bureau and an overwhelmed grand old man - need to be accorded signal recognition. For without the coordinating efforts and continuous application to the effectuation, with all too limited resources, of the wish of the President, the project would have died in infancy.

This, too, has a most important bearing on the present and the future. For none of the bills

before Congress is at all adequate for (a) the proper organization of scientific activities under governmental auspices, or (b) the prosecution of peacetime and civilian discoveries and applications of nuclear physics. It is regrettable that the testimony given so far, inclusive of that of the scientifically trained administrators, has remained blinkered and cast in the mould of the prewar organizational concepts and mechanisms, and that neither the Administration nor Congress has seen fit to secure the leisurely and reflective evocation of the lessons of the atomic bomb project under prewar and war conditions for the necessarily altered and reoriented postwar.

5. The correct history can thus be a prelude to the corresponding creative act of adjustment of the atomic bomb and atomic energy to the ends of peaceful international relations and the effectuation of the far-reaching economic and welfare potentialities. And for all this, Government and representative citizenry need to be utilized, lest both in the military and civilian applications we become victimized by Maginot-mindedness.

In sum, in contrast with the reports, I submit that the distinctiveness of the history is not the culminating stage of the technological production on unparalleled scale, but rather the telescoping - as distinguished from the established pattern, of the time-serialization - of the stages of (a) theoretical experimentation, (b) slow-motion groping in numerous university laboratories, (c) cognate experimentation as a side-line to the other activities of institutions focused into applied science and technology, (d) then the organization of single or multiple pilot plant developments by corporations concerned in the main with promotion of established products, and finally (e) the launching of commercial production and that, in turn, on scales ranging from small to large.

With high regard,

Yours sincerely,

Hon. Henry A. Wallace
Secretary of Commerce
Department of Commerce
Washington, D. C.

OFFICE OF STRATEGIC SERVICES
WASHINGTON, D. C.

21 September 1945

Dear Alexander:

Thank you for allowing me to read
your excellent report.

I look forward to the day when it may
receive a wider audience than the privileged few.
History deserves the full story of the Atomic Project.
The nation is indebted to you for the catalytic
function which you performed.

"We may our ends by our beginning's know."
How could the project have ended other than success-
fully when you - the deft intermediary between committee
room, laboratory, and planning board - helped lay its
foundations so well?

The report is returned herewith as
you requested.

Sincerely,



William J. Donovan
Director

Dr. Alexander Sachs
72 Wall Street
New York, New York

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OFFICE OF STRATEGIC SERVICES
WASHINGTON, D. C.

21 September 1945

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Thank you for allowing me to read your excellent report.

I look forward to the day when it may receive a wider audience than the privileged few. History deserves the full story of the Atomic Project. The nation is indebted to you for the catalytic function which you performed.

"We may our ends by our beginnings know." How could the project have ended other than successfully when you - the deft intermediary between committee room, laboratory, and planning board - helped lay its foundations so well?

The report is returned herewith as you requested.

Sincerely,

(sgd) BILL

William J. Donovan
Director

Dr. Alexander Sachs
72 Wall Street
New York, New York

Extracts from

NOTES ON THE

A.T.T. MEETING OF ECONOMISTS

September 28, 1945

.....

General Ayres then asked Dr. Alexander Sachs if he would be willing to depart from the usual conventions of our meeting and reveal to the group insofar as he could the very extensive part that he had played in the development of the atomic bomb. After much urging, Dr. Sachs said that as an amateur he had been following physical research and before the war he had been interested in helping refugee scientists and to the extent that he had savings he gave them to bring such scientists to this country. In the 30s he reached certain conclusions and become convinced that war was inevitable and that it would be a different kind of war than those in the past. In the spring of 1939 an article was published first mentioning the fission of uranium. The early work done here in America on that subject was more important than that done elsewhere in the world. It is impossible to do justice to the prewar work. As a result of the publication of this article Dr. Sachs and a number of his associates began to discuss the implication of the fission of uranium for the war. It is to be noted that in its beginning it was a political concept rather than a scientific concept that was motivating. The idea was evolved out of this discussion that the American Government should have knowledge of the developments with respect to uranium and should have a fostering influence. It was urgent because America has a distinct disadvantage with respect to weapons of a surprise kind. Totalitarian governments have a very great advantage. On August 2, 1939, before the outbreak of World War II, a remarkable letter to Mr. Roosevelt was written, signed by Dr. Einstein. Some time later it was delivered to President Roosevelt by Dr. Einstein's friend, Dr. Alexander Sachs, along with supporting scientific memoranda and data. Both Einstein and Sachs believed that catastrophe hung over the human race and that in the course of that catastrophe atomic energy would have a part. Dr. Einstein pointed out the possibility of nuclear chain reaction in a large mass of uranium, which if exploded in a port would destroy the whole port with some of the surrounding territory. Mr. Roosevelt grasped the situation and it may be said that the letter and the interview were the beginning of the atomic bomb project well before the United States was at war. From then on the problem was an awful one of convincing people. The native scientists were not in favor of the project. However, on Nov. 1, 1939 a report was made favorable to the project. It required that a small experiment be conducted in chain reaction. Dr. Sachs reported that to his everlasting credit President Roosevelt grasped fully what it was all about and instructed General Watson to act as liaison, and asked Dr. Lyman Briggs of the Bureau of Standards to constitute a committee of the armed services, a committee on which Dr. Sachs served as representing the President. The experiment was conducted at Columbia on a small scale but turned out astonishingly favorably with a result that the Briggs Committee was able to recommend further action.

Throughout the early development the whole project was handicapped by lack of funds, by the difficulty of persuading people and by the fact that the thing itself could not be talked about except in greatest secrecy. It became

evident to Dr. Sachs that a bigger and better functioning organization with more finances was needed to take the place of the Briggs Committee and fortunately there was an executive scientist available with financing in the person of Dr. Vannevar Bush. Dr. Sachs recommended his views to the President, performed his own disappearance from the scene and that was the genesis of the National Research Defense Committee under Vannevar Bush which handled the \$2 billion and produced the atomic bomb.

Dr. Sachs recounted some of the early disappointments including the failure to get hold of a supply of uranium in Belgium most suitable to the project which because of American dallying fell into the hands of the Germans. He referred briefly to a series of interchanges between this country and the British which resulted in most of the basic work on a pilot plant being performed in the United States before the United States entered the war.

Beyond this point in the development he said that he was not permitted to make further disclosures. He did, however, feel that it was appropriate to make certain observations. He noted that even though the bomb business was much further under way before we got into the war than most people dreamed of, the bomb was not completed until the very end of the war. This nation had the most time-borrowing of the nations at war and in modern warfare it is very hard indeed to engage in time-borrowing. The problem today is whether you are going to survive in the present, not whether you are not going to survive in the future. We have the type of warfare in the world that gives you no time to prepare today. Totalitarian governments have a tremendous advantage in this sort of thing over the democracies. They normally and naturally concentrate the scientific aptitudes and energies within their countries into the development of surprise weapons. During this war many of the weapons which we later used were copied from the Germans. It was only through the wit of the President to perceive and the genius, the friendship, patriotism and the intelligence in a group of scientists not acting as scientists but acting in a political way that we were able to get the most original of all government projects under way, to get it ahead of the Germans and yet to get it done only as the war came to a close. The weapons of science are so potent and can be so new that there is no safety to be had in disarmament programs or in having control or inspection over and in other countries. The apparently peaceful airplane may in the future carry a few capsules by which the territory over which it flies may be left destroyed. We must most carefully consider the implications of weapons which are so thorough and instantaneous as to give you no time at all. This rears the problem which is now supremely important with regard to political and social structures. It raises the query as to what kind of government is required. The government may have to devise instruments of its own because the cleavage between pure and applied science has obviously vanished. Our own atomic bomb project illustrates perhaps for the first time the simultaneous carrying on of pure research, pilot plant and production plant. But having been done once, it becomes the model particularly for totalitarian states for the future. The role of scientists in economic life has vastly increased. We should bear in mind that the history of inventions, if we step outside of inventions in the industrial revolution and in the countries (democracies) where they flourished most, has been not invention for peacetime purposes but invention in the construction of weapons. The peacetime application has followed the weapons' perfection. It is possible that this war has restored the historical patterns, for it has demonstrated that science, for a while the source of peacetime invention, can also be drafted and must be drafted as a source of invention for war.

September 27, 1945

Dear Dr. Einstein:

Mindful of our close collaboration in 1939 and 1940, through the mediation of Dr. Szilard, I desire to transmit for your own records copy of a report which I prepared for a Cabinet officer synthesizing on the basis of contemporaneous memoranda that I kept the presentation of the project to President Roosevelt in October, 1939 and the ensuing developments up to the establishment by the President, in accordance with suggestions submitted, of the special Committee on Scientific Research and Development. I am also enclosing copy of a message sent on September 7th to the conference convoked by my friend Raymond Swing, embodying some considerations as to the altered world situation and the opportunity for leadership presented to the United States.

With high regard,

Sincerely yours,

Dr. Albert Einstein
Princeton, New Jersey

PSF
Combined Policy
Comm.



Franklin D. Roosevelt Library
CLASSIFIED
AEC to Director NLR
2-12-70

June 8, 1944.

Dear General Watson:

When I was with the President this morning, I got one copy of the enclosed memorandum initialed by the President but overlooked the fact that two copies were initialed by Mr. Churchill and, therefore, copies need the President's initials. I am, therefore, sending you one copy by hand with the request that the President initial it in order that the records of both Great Britain and this country may be complete. If you will send it back to me when it is completed, I will greatly appreciate it.

Sincerely yours,

Henry L. Stimson

Secretary of War.

Major General Edwin M. Watson,
Military Aide to the President,
The White House.

*Initialed and
Handed to
Maj. Watson
for delivery to the
Secy of War.*



(07)
P
Y

Collaboration between the Authorities of the United States of America and the United Kingdom in the matter of Tube Alloys.

We hereby appoint Sir R.I. Campbell, K.C.M.G., to succeed Colonel the Rt. Hon. J.J. Llewelin, C.B.E., M.C., M.P., with effect from the 10th December, 1943, as a Member of the Combined Policy Committee which was set up under the Articles of Agreement governing collaboration between the Authorities of the United States of America and the United Kingdom in the matter of Tube Alloys; which were approved by us on the 19th August, 1943.

N. F.R.

S/ W.S.C.

Chron

3 C

THE SECRETARY OF COMMERCE
WASHINGTON 25

September 20, 1945

Mr. Alexander Sachs
72 Wall Street
New York 5, New York

Dear Alexander Sachs:

Enclosed is a proposed letter which
I intend sending to Secretary Patterson. Do you have any
corrections or additions to make?

Sincerely yours,
H. A. WALLACE

Enclosure

THE SECRETARY OF COMMERCE
WASHINGTON 25

Honorable Robert F. Patterson
Secretary of War

Dear Secretary Patterson:

I received recently a letter from Secretary Stimson dated September 13, 1945, with regard to the early history of the atomic bomb in 1939 and 1940.

After studying the Smyth Report and also the material submitted to me by Alexander Sachs, I cannot help reaching the conclusion that the Smyth Report does not do justice to the part played by President Roosevelt and those who stimulated him to action on October 11, 1939. Neither, it seems to me, is sufficient credit given to the part played by Dr. Lyman Briggs in the latter part of 1939. When the permanent record is prepared, it seems to me these deficiencies should be corrected.

Sincerely yours,

H. A. WALLACE

Chron

File Wallace



THE SECRETARY OF COMMERCE
WASHINGTON 25

September 18, 1945

Mr. Alexander Sachs
72 Wall Street
New York 5, New York

Dear Alexander Sachs:

Enclosed is copy of a letter I received from Secretary Stimson. I haven't written him in reply, but from what I have seen of the Smyth Report there is no adequate recognition of the part which President Roosevelt played under the stimulus of you and your friends.

Sincerely yours,

H. A. Wallace

Enclosure



C O P Y

War Department
Washington

September 13, 1945.

Dear Mr. Secretary:

The material transmitted by your letter of September 7 does indeed present a dramatic story. As you doubtless know, the early stages of the development of the project with which this material deals has been covered in the Smyth Report. I am retaining the documents to be put with the official files on this subject.

Sincerely yours,

(signed) Henry L. Stimson
Secretary of War.

Honorable Henry A. Wallace,
Secretary of Commerce,
Commerce Department
Washington, D. C.

Chmn

Mordecai Kaplan
per

DANN, ATLAS & TILCHIN
Attorneys and Counsellors
2415 Barlum Tower
Detroit 26, Michigan

December 7, 1945

Dr. Mordecai M. Kaplan
c/o The Society for the Advancement of Judaism
15 West 86th Street
New York 24, N. Y.

Dear Dr. Kaplan:

The following is a brief resume of the conference I had with Dr. Einstein - the full details of which I will give you at another time.

.....

Those who have indicated the ability to search and seek after truths unbound by dogmas and traditions should be engaged to attack and solve these problems such as was done to produce the atomic bomb and is now being done to find a cure for cancer.

.....

He indicated his anxiety to serve with this group to produce the foregoing but - HE WOULD HAVE TO BE ASKED - FIRST -

As to whether a world or England would respect the combined efforts and results of such a group he commented: "A state no larger than a Jewish State with knowledge of the formula for the atomic bomb could scare the British Fleet to the bottom of the ocean."

.....

In order to remind each Zionist of his daily task a small white parchment containing the four portions of the law, inclosed in a red mezzuza with a blue Star of David background be attached to the doorpost of every home that is completely Zionist, namely, where each and every member of the household over the age of 13 is a member of some branch of the Zionist Organization.

That a complete boycott, socially and economically, be adopted by Zionists against all Jews who are either non-Zionists or Anti-Zionists.

.....

As an example, the local situation could be improved if competent leaders (not necessarily Rabbis) were placed in charge of the following Departments to effectively function in a manner indicated by the title:

- (1) Executive Department. (The type of leaders and leadership Herzl referred to in Altneuland.)
- (2) Educational Department. (In conjunction with a publicity and propaganda division that would know how to drive the story of Zionism home in a simple manner capable of reaching the level of intelligence of those for whom it is intended.)

- (3) A Police and F.B.I. Department. (To deal in a proper, militant manner, if necessary, against non-Zionists and Anti-Zionists.)
- (4) A Jewish Commonwealth Office. (Whose purpose it would be to protect the Jewish State established by the Mandate in a manner comparable to the methods used by the British Colonial Office to destroy it.)
- (5) A Public Relations Department. (Staffed with diplomats that would know how to deal with men in public office and public opinion.)
- (6) A Legal Department. (To protect the rights of Zionism under national and international agreements.)

Some of these Departments exist at this time in name - and name only. Under Einstein's plan there will be little or no room for picture taking or the personal aims, ambitions and exploitations of those who now occupy positions of trust for which they are not suited.

.....

Yours very truly,

SO. A. DANN

[Corresp: Bac - Bar]

File - Baltimore Sun

The Evening Sun
SUN SQUARE
Baltimore, Md.

Editorial Department

November 21.

Mr. Alexander Sachs,
1 South¹ William street,
New York City.

Dear Sir:

I am the Baltimore Sunpaper reporter who called you by telephone last week to ask about the truth of a reported incident in connection with the early development of the atomic bomb.

This incident had to do with the reportedly unsuccessful efforts of a foreign-born scientist to interest either Army or Navy in atomic energy for military purposes. Later the scientist was reported to have visited Einstein, and then to have called upon you.

In our telephone conversation you referred me to the Smyth report. After looking into this report I have concluded that the story in which I am interested probably is contained in 3.4 (Pages 46 and 47), and that the scientist probably was Professor Enrico Fermi.

The Evening Sun
sun square
Baltimore, Md.

Editorial Department

As I first heard the story, the scientist who approached the Army and Navy received the brush-off. But the Smyth report does not indicate that Professor Fermi received any such treatment. And since my conversation with you, I have also talked by telephone with Dr. Pegram at Columbia. He tells me that he knows nothing about Fermi or any other scientist being slighted in this connection.

I was particularly interested, when I called you, in obtaining a detailed account of the manner in which the Army and Navy had been approached on the proposition of atomic energy for military purposes. After talking with Dr. Pegram and reading the Smyth report, I am of the opinion that the story has been pretty completely told.

But I would be glad to have your opinion on this.

Yours truly,

Lee McCardell.

Lee McCardell.

File Szilard [Coverup - Szilard]

December 18, 1945

Dear Leo:

I should very much appreciate your comments on the enclosed clipping of an article by John J. O'Neill in Sunday's New York Herald-Tribune, setting forth some hypotheses regarding the atomic bomb as a weapon of naval warfare.

As a mere lay student, I should like to ask whether account need not be taken of certain recent researches regarding the presence in water of radioactive elements.

I should also be particularly interested in your reaction to Mr. O'Neill's views as to the greater vulnerability of submarines than surface ships, apart from the fact of the lesser detectability of submarines to the attacker.

With kind regards,

Cordially yours,

Dr. Leo Szilard
1155 East 57th Street
Chicago, Illinois

Chrom

3C

September 5, 1945

Dear Gustl:

As the initiator of what might be called the pre-history of the project through your introducing Dr. Sillard to me, I desire to make available to you, for your strictly personal perusal, an historical account of the early phases of the work on the atomic bomb which I prepared for a Cabinet officer. Accordingly, I am enclosing herewith copy of the report entitled "Early History Atomic Project in Relation to President Roosevelt, 1939-40," August 8-9, 1945

That report excluded from its purview all matters even bordering on the present technical features. Rather, it focused on (a) the procedure by which the idea - after having been presented to and accepted by the President - was converted from a possibility into a concrete project, and (b) the fostering guidance by which an appropriate organizational framework was established for its prosecution and effectuation.

The contemporaneous record that the writer kept encompassed not only the facts but the now scarcely recapturable meanings that were attached to them; and so the periodic synoptic views submitted by him served as a catalyst for the very desired vital change in scope and tempo of the work on the project.

Thus the report may be regarded as a laboratory test of the continuing need by our society, in economic and political policy-making, of organs of reflection for the sake of better direction of the historical flux. For as the late Justice Holmes observed, echoing Spinoza, one of "the modes in which the inevitable comes to pass is through effort," - including the effort at insight and perspective on current "historification."

I should appreciate your returning this document to me at your early convenience.

Sincerely yours,

Dr. Gustav Stolper
52 Wall Street
New York City

August 23, 1945

Dear Mr. Secretary Wallace:

Thank you for your kind note of August 21st.

As implicit in the present phase are the questions of correcting the inadequacy in the published accounts and, equally importantly, according such recognition to the part played by the Bureau of Standards as will serve to dramatize the scope for leadership by Governmental agencies in the interrelations of science and national welfare, I believe you will be interested in an amplification of the second page of my letter to you of August 10th.

As you will note from that letter, the unavailability to the publicity people of the War Department of an orientation on the early history of the project - that they would have secured had President Roosevelt been alive - led them to leave an enormous gap between the very origins - in respect to which those who introduced the project to President Roosevelt are referred to merely anonymously - and the establishment in mid-1940 of the Committee for Scientific Development headed by Dr. Bush. . . Those who had an opportunity to see the large report prepared by Dr. Smyth - already out of print - tell me that in that report the gap is not so large because the names and dates connected with the initiation of the project are set forth therein. But it would seem that there is lacking not only perspective, but articulation of the services that were rendered by the Bureau of Standards as well as the initiators, so that the periods corresponding to what one might call the infancy and adolescence of the project encompassed between the summer of 1939 and the summer of 1940 remain a comparative blank, even in the full-length history prepared by the War Department.

Without trying at this point to review what was presented in the special report sent you for submission to Secretary Stimson and consequential action, it may be worth while to etch in certain salient features of that report.

In the months before the outbreak of the war in 1939 a trio composed of Dr. Einstein, Dr. Leo Szilard and the writer literally together spelt out the broader scientific significance and social implications of the new advance in nuclear research that was made at Columbia University by Dr. Szilard and Dr. Fermi working as an experimental team. By a leap of thought

we overcame the hesitations and cautions entertained by Dr. Fermi - as set forth on pages 1 and 2 of my review-memorandum of April 20, 1940, forming Exhibit 17 of the material sent you. We thus reached the conclusion as to the probability of the establishment of a chain reaction or a cumulative process in fast, as distinguished from slow, neutrons, which meant that an atomic bomb could be within reach of attainment. Then, concerned as we were over the prospect of war outbreak and the probability of initial Nazi victories - the present writer's interpretations of the period being embodied in the memorandum of March 10, 1939 forming Exhibit 1 - we not only concluded that the President must be advised, but also evolved a program of action for accelerating the research in this country, for collaborating with scientists in Great Britain and France, and for creating conditions of secrecy so that there would be no leak to the enemy of civilization of the progress being made on this side. We had to await a clearing by the President of the then insuperable obstacles presented by the neutrality legislation before I could secure his attention under conditions permitting the right presentation and articulation of the far-reaching significance of the incipient research. Thanks to the opportunity accorded by the President at the conference at the White House of October 11, 1939, a liaison was established with General Watson, and an inter-governmental committee was formed under the chairmanship of Dr. Briggs, Director of the Bureau of Standards, Lt.-Col. Adamson for the Army, and Commander Hoover for the Navy. The non-governmental people selected by the President to serve as the coordinators were Dr. Einstein and myself. But as Dr. Einstein, on account of shyness and varying health, could never attend, I deemed it necessary that someone be added, and suggested Dean Pegrum, the head of the Department of Physics of Columbia University, by reason of his administrative importance for the work pursued at Columbia.

From then on the task was three-fold: First and foremost was to stimulate and accelerate the governmental group to give its approval of the project. It is to the shining credit of Dr. Lyman Briggs that he was able to get this committee to authorize and accord approval in his report of November 1, 1939. The second task was the reconnaissance of the types of research that were then deemed pertinent and the determination, so to speak, of a schedule of priorities. Third, and as the goal, the securing without delay of the necessary financial aid for the prosecution of the Columbia research that in the opinion of the initiators of the project was deemed to be at once most crucial and most promising: for at the time, the eminent academicians from the outside who were brought into the circle of confidence were more eager for a distribution of aid to all

sectors of the field than concentration of financial support. It is in connection with the latter two tasks that Dr. Briggs's aid was so notable and so decisive. Parenthetically, this setting of the problem - alluded to in the penultimate paragraph of my letter of August 10th - has a far-reaching bearing on the relationship of Government to scientific research, in that, to put it at the very least, there is urgent need under our system for not merely coordination against centrifugal tendencies in university research, but provision of organs of unification and focusing of national will on national urgencies in scientific progress connected with national welfare.

Reverting to the body of the report, from the spring of 1940 on and the successive unfolding of the Nazi aggressions over the Continent it became poignantly clear to the writer and his colleagues that the indispensable condition for the effectuation of the project was to lift it out of the slow-motion configuration in which university research is embedded, as contrasted with commercial research - described in the already noted memorandum of April 20, 1940. Hence the labors of the second quarter of 1940, as fully documented in my report and exhibits, were focused on the establishment of a Scientific Council for National Defense. In the early phases where the Government appropriations were so inadequate, the provision of funds for the graphite experiment that was so crucial was a great and most desirable contribution, that again was canalized through the Bureau of Standards. But the financial requirements had to be so very much larger. The incidental information that came to me of the interest evinced by the Carnegie Institution and its Director, Dr. Bush, reinforced my convictions regarding the advisability and the necessity of the establishment of a new organizational instrument by the President. This was finally effected by the Presidential action of June 15th, 1940, as recorded in the report and exhibits.

Mindful of your participation in the policy committee that had been appointed by President Roosevelt and of your present relationship to the Bureau of Standards, it has been my desire to make available to you this and the prior material in furtherance of such effort as you might be making in the way of representations to Secretary Stimson regarding the needed revision and re-orientation on the historical origins and the initial development of the project.

Sincerely yours,

Hon. Harry A. Wallace
Secretary of Commerce
Department of Commerce
Washington, D. C.

11/45
Chron

CONFERENCE WITH WALDO COHEN

I.

1. In the administrative level, the important figures were Bush, Conant, K. T. Compton. In the second, or the creative scientific level, it was Urey, Fermi, Wigner, R. J. Oppenheimer, S. K. Allison of Chicago, Teller, A. H. Compton, and Leo Szilard.

The first group worked very closely with the military and was in a sense part of it. The third group, or the mass of individual scientists, was made up as follows: In the Oak Ridge, Tennessee, Project, there was the Clinton Laboratories, which had 200 scientists. Under the auspices of Columbia University there was the Manhattan District Project of about 200. In Chicago there were the Metallurgical Laboratories, with about 100. Then there were small groups at Iowa State, and at Berkeley, California, or the Lawrence group.

These groups were very much bound by the restrictions imposed by the military. The restrictions were so great that a common saying was that "all of us had to break the securities in order to get our work done." At Oak Ridge the military took charge in the middle of 1945.

2. The associations which had been formed are built around the scientific groups in the various projects. First there was the Association of Los Alamos; second, the Association of Oak Ridge Scientists at the Clinton Laboratories; then the Atomic Scientists at Chicago; and finally, the scientists in the Manhattan District. All these groups are now concerned over the political and social implications.

II.

Some of the radio-active materials which occur or can be made in existing units will aid biology and medicine in the investigation phase and in the therapeutic phase.

Even before the discovery of the atomic bomb there had been a great deal of work on what is called radio-active tracers.

For example, at Oak Ridge one of us wanted to know whether in an automobile there was a leak from the cooling system to the combustion system of the engine. How can one tell that the water coming out of the exhaust pipe came from the cooling system? He put in the cooling system a little radio-active sodium and then tested the exhaust pipe with a Geiger counter, a device for measuring radio-activity. If he found radio-active sodium in the exhaust, it proved where the leak occurred.

This has also been used in medical diagnosis to detect the percentage of phosphorus going into the bone by putting a little radio-active stuff in the blood and the excreta. The basic thing about the tracer is that chemically it cannot be separated from the thing it traces. It can also be used as a therapeutic agent.

In industry, to detect the efficiency of what is put in in terms of what is gotten out, all you need to do is to add a certain amount of radio-active sodium at the input end and measure the radio-activity of the final product. The ratio of input to the output in radio-activity will indicate the efficiency.

III.

1. In respect to power, Oppenheimer and also Allison have thought that that was the next thing. Both the pilot plant at the Clinton Laboratories and at Hanford Engineering Works in Washington may permit that. For there the plutonium piles are producing power, but the power is not in usable form, because it is not equipped to run at high temperatures.

The plutonium piles at Hanford Engineering Works are raising the temperature of the Columbia River noticeably. The plutonium piles at Hanford are producing power of the order of 100,000 k.w. At the Clinton Laboratories there is consideration of building different piles for power. It is thought that there could be produced what are called Breeders - that is, they will produce more of the material - the uranium or plutonium - than is used up.

2. As to the immediacy, the experimentation with other materials would be thorium. Silicon is remote. If it is made to work, we would have an inexhaustible material.

The main thing is the possibility of cheap isolated power plants without connection with a resource fuel like coal. It will not be necessary to feed enormous quantities of the raw material, like coal, and bring the coal over long distances, with the freight charges.

Such a power plant could be started in the Nevada desert. The Great American Desert starts from New Mexico and goes to Canada, and covers the states of Washington, Oregon, Idaho, Nevada, Arizona and New Mexico. The Imperial Valley of California would be a desert without irrigation.

EXTRACT FROM PRELIMINARY TRANSCRIPT OF TESTIMONY -
JUST RECEIVED FROM SYLVIA GREEN, EDITOR -
BEFORE U. S. SENATE SPECIAL COMMITTEE ON ATOMIC ENERGY, S. RES. 179
NOVEMBER 27, 1945
BY FIRST WITNESS, ALEXANDER SACHS

pages 30-31:

Later on, there were all kinds of difficulties about getting the supply to which I referred. In the following year there was another refugee, an industrialist engineer, by the name of Pregel, who made available very valuable supplies to Columbia University for the experiments of Dr. Szilard and Professor Fermi, for which he was thanked by Dean Pegram.

Page 52:

Following those discussions, I broached the problem of the supply of uranium for the United States.

I pointed out that the biggest supply of uranium was in the hands of the Belgians. I pointed out that even if they sent it to France, it would not come to us, that we had to open diplomatic negotiations.

Incidentally, that industrialist I mentioned, Pregel, who at that time was in France and was a French citizen, had asked his own government to make arrangements with the Belgians and he had asked it in 1939.

That prescience on the part of these refugees, gentlemen, was operative because they were united by a political sensitivity along with their respective expertises as scientists and technologists.

Chron
11/457

Extract From
Paper by Dr. Arthur E. Morgan Entitled
"The Prussian Bird in the American Nest"

... Then there comes the atomic bomb. Alexander Sachs, who was directly effective in bringing the atomic bomb project to the attention of the President, states that both the army and the navy opposed the project (though two individuals in the service were interested). This most powerful of all military forces, therefore, like so many other concepts requiring ranging imagination, would have been lost if the West Point and Annapolis judgment had not been overruled by an imaginative President, with the encouragement of the civilian head of the U. S. Bureau of Standards, Lyman J. Briggs, who did see the possibilities.

Mr. Sachs holds that such limitation is not the characteristic of the military mind alone, but of the highly specialized mind in general.

RAYMOND SWING
Friday
September 7, 1945

Chron
[Chron. - Swing]
WMAL
American Broadcasting Co.

In Berlin, back in the early 1920's, I came upon something I thought the most irrational conduct I could well imagine. It was a mass meeting, held in the hall of the Philharmonic, to protest against the theory of relativity of Dr. Albert Einstein. The meeting was crowded, and, as I recall it, was addressed by at least one fairly reputable scientist. The purpose of the meeting, of course, was anti-semitic, and the intention was to disparage the scientific work which had already won world-wide notice and acclaim for Dr. Einstein. I simply could not understand how anyone in his right mind hoped to prove that the theory of relativity was wrong by declaiming against it in a mass meeting.

As early as 1905, Dr. Einstein clearly stated that mass and energy are equivalent. He also stated that this equivalence might be found by the study of radio-active substances. He set down his formula, E equals mc^2 , perhaps the most startling and far-reaching assertion of its kind ever made. For it says that energy is the equivalent of mass, multiplied by square of the speed of light. To put this statement into numbers, and quoting the Smyth report, one kilogram of matter--just over two pounds--if converted into energy, would give 25,000,000,000 kilowatt hours of energy, or as much as is generated in nearly two months by the entire electric power equipment of the United States. So scientists have been familiar with this concept for a long time. Some of them accepted it as probably true, but undemonstrable. Some dared to believe that one day atomic energy would be unlocked and give man the use of power beyond his most fantastic dreams, since he then could wield the basic power of the universe itself.

I am not going into the history of the development of atomic research. I do wish it could be made simple and could be grasped by everyone. For unless the mind fathoms at least a little of the depths of meaning of man using atomic power, there can be no wise political action which makes that use safe and beneficial.

HISTORY OF ATOMIC BOMB

But tonight I am going to tell a little of the history of the development of the atomic bomb which has not been more than referred to in the government release on the project.

It brings me once more to the name of Dr. Einstein. The mass meeting in the Philharmonic in Berlin had not affected the theory of relativity, but the organized bigotry behind it had led the great physicist and mathematician to go abroad, and finally to take up his home at Princeton. And there, on August 2, 1939, just a month before the outbreak of World War II, he wrote a remarkable letter. It is not as remarkable as that formula that E equals mc^2 . But it is the letter that appropriately led to the development of the atomic bomb and the demonstration of the validity of the formula. So it was a step to the expansion into another dimension of the power available to the human race.

This letter was addressed to "F.D. Roosevelt, President of the United States, White House, Washington." It starts with the sentence: "Some recent work by E. Fermi and L. Szilard, which has been communicated to me in manuscript, leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future."

ALEXANDER SACHS VISITS ROOSEVELT

It happens that this letter did not reach President Roosevelt until after the outbreak of war. It was not posted to him. It was taken to him, along with scientific memoranda and data, by Alexander Sachs, of New York City. Mr. Sachs is one of the most brilliant of living economists. He also is a noted student of world affairs, and one of the most brilliant analysts of them. And he is a friend of Dr. Einstein. Both he and Dr. Einstein believed in August, 1939 that catastrophe hung over the human race, and that in the course of that catastrophe atomic energy would have a part. They felt they must bring the latest news of atomic research to the knowledge of the President in the cause of national defense.

Let me quote another passage from Dr. Einstein's letter to President Roosevelt. "In the course of the last four months it has been made probable," he stated, "through the work of Joliot in France, as well as Fermi and Szilard in America, that it may become possible to set up a nuclear chain reaction in a large mass of uranium, by which vast amounts of power and large quantities of new radium-like elements would be achieved in the immediate future." Dr. Einstein went on: "This new phenomenon would also lead to the construction of bombs, and it is conceivable--though much less certain--that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port, together with some of the surrounding territory. However, such bombs might very well prove to be too heavy for transportation by air."

This was a few months after Hitler had seized Prague, and Dr. Einstein told the President that Hitler thereupon had stopped the sale of uranium from the Czechoslovakian mines. This action, he suggested, was linked with the fact that the son of the German Secretary of State von Weizaecker was attached to the Kaiser Wilhelm Institute in Berlin, where some of the American work on uranium was at that time being repeated. Dr. Einstein recommended that the President appoint someone on his behalf to keep government departments informed of developments, who also could give attention to obtaining a supply uranium for the United States, and that experimental work in this country should be speeded up.

With the material Mr. Sachs took to President Roosevelt on October 11th, 1939, was a memorandum by the physicist Szilard, one of the men whose work at Columbia had brought uranium research to the brink of culmination. His statement reported that investigations so far had been limited to chain reactions based on the action of slow neutrons. "At present," he said, "it is an open question whether such a chain reaction can also be made to work with the fast neutrons which are not slowed down. There is reason to believe," he continued, "that if fast neutrons could be used, it would be easy to construct extremely dangerous bombs. The destructive power of these bombs can only be roughly estimated, but there is no doubt that it would go far beyond all military conceptions." I hardly need to interpolate that the fast reactions were made to work, which is the secret of the atomic bomb as it finally was used.

BRIGGS COMMITTEE SET UP

To his everlasting credit, President Roosevelt grasped fully what he was told, instructed his aide, General Watson, to act as liaison in the matter, and asked Dr. Lyman Briggs of the Bureau of Standards to constitute a committee of the armed services, a committee on which Mr. Sachs served as representing the President.

There were tedious delays before the atomic project was to be turned over to the entirely new National Research Committee under Dr. Vannevar Bush, which brought the bomb to reality. Of the several physicists consulted, some were anything but sanguine of success. Dr. Einstein and Professor Szilard were the ones most outspokenly confident that results could be achieved. A preliminary experiment at Columbia had to be waited for. It was on a small scale, but it turned out astonishingly favorably, so the Briggs Committee was able to recommend further action. But, in the meantime, priceless months were dribbling away, and the Germans were working with all scientists available to them on uranium.

Our Navy Department put up \$6,000 to buy some materials. And another memorandum about atomic power by Professor Szilard spoke of the possibility of driving battleships with atomic engines. If only slow neutrons were utilized, a ton of uranium, he said, would equal 3,000 tons of oil; if the fast neutrons could be utilized, one tone of uranium would equal 300,000 tons of oil. A battleship with such a reserve of energy could stay away from fuel resources almost indefinitely.

On March 7th, 1940, Dr. Einstein felt the need for greater haste. This was during the "Phoney War" period, with the invasion of the western democracies imminent. "Since the outbreak of the war," he wrote, "interest in uranium has intensified in Germany. I have now learned that research there is being carried out in great secrecy and that it has been extended to another of the Kaiser Wilhelm institutes, the Institute of Physics." Dr. Einstein spoke of the need to keep scientists in the democracies from publishing their work on setting up a chain reaction in uranium. Dr. Szilard himself had written up a method for setting up the chain reaction. Later the effort was made to have the physicists in the democracies withhold their work from publication, so as to keep news of it from the Germans. The British agreed, but because one manuscript already had been inadvertently published, the French balked. Later of course, this research became the top secret of all top secrets.

PROJECT EXPANDS.

The war itself was to bring pressure on the project at this stage. By April 27th, after the invasion of Norway, the Briggs Committee was ready to recommend further action, as the doubtful Thomases among its members became much less doubtful. On May 10th, the very day of the German invasion of Holland, Belgium and France, the four chief Columbia University scientists, Fermi, Szilard, Pegrarn and Urey, were ready to plump for a large-scale experiment, that would cost anything up to half a million dollars.

And so it became clear that a bigger and better functioning organization was needed to take the place of the modest Briggs Committee. Mr. Sachs recommended his views to the President, and that was the genesis of the National Research Defense Committee under Vannevar Bush, which handled the \$2,000,000,000 and produced the atomic bomb. Naturally what this committee accomplished is the main part of the story. But before this could be done there had to be a chain of actions, which in the field of government can be as difficult to assure as in treating the atoms of uranium. Genius, friendship, and patriotism, and in the President, the intelligence to know what it all could mean, had to combine to get the most original of all government projects under way.

To come back to that anti-Einstein mass meeting in Berlin, indirectly it served this country, fabulously, as did the tyranny in Germany and Italy, in bringing us the services of great scientists whose joint efforts produced the release of atomic energy.