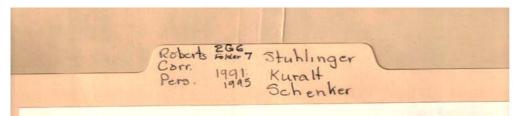
Image 1 r02g06-07-000-0032 <u>Contents</u> <u>Index</u> <u>About</u>



DR. ERNST STUHLINGER

26 December 1995.

Huntsville, Alabama 35801 3106 Rowe Drive S.E., U.S.A. Telephone: 205-534-9828

Dr. Frances Roberts 603 Randolph Street Huntsville AL 35801

Dear Frances.

let me first say again how much Irmgard and I enjoyed the delightful afternoon with you and Dorothy! We are looking forward to seeing you again at your traditional eggnog celebration on New Year's Day. We will have to come in the afternoon, though, because both of our sons will leave on January first, Christoph (by car for Maryland) in the late morning, Tilman (by plane for Arizona) around noon.

You asked me for copies of some of my recent writings; they are enclosed. - You also asked me who of the "oldtimers" is still around and would be able and willing to write down some memories of the early times in Peenemmende, in Fort Bliss, and in Huntsville. I thought of it carefully, but then arrived at the sad answer: almost nobody. Many of them have died, others have reached a point in their personal evolution where they do not remember things of the past, or at least are no longer in a mood, or in a condition, to write about past times. Eberhard Rees, for example, who was von Braun's deputy for 30 years, has lost any recollection of earlier times. The best chronicler of the entire team, Dieter Huzel, died a year ago. The only person who is still active and at the same time knowledgeable is Dr. Gerhard Reisig, who lives on White Circle; he is presently writing an elaborate book on the technical work that was going on at Peenemuende, without dwelling much on personal and human aspects. His book will certainly be a very important, accurate, and valuable document of the early accomplishments in rocket history; on the other hand, it may not be exactly what you have in mind. - You may know that Dave Dooling and Dave Christensen taped a number of interviews with oldtimers a few years ago; that material, to my knowledge, has never been transcribed, but the tapes exist, I believe at the Space and Rocket Center in Huntsville.

Beginning in the early 1980s, essays and books appeared on the market, written by young historians who dug out large numbers of archived documents and reports written during the late 1930 and early 1940s, and who claim to have written a "definitive history of Peenemuende and the von Braun team" of those years. All of them overlook the decisive fact that those documents were written either by Nazi officials, or for the consumption of Nazi officials, and that nobody who wished to continue his work, and to retain at least the modest amount of freedom left to individuals at that time, would have dared to put his true feelings, thoughts, motivations, and actions into a printed document. - Some did, but they paid for it with their freedom, or with their lives. Trying to write the history of those years solely on the basis of existing archived reports would remain a hopeless enterprise.

When I read historical essays by young Huntsvilleans, I am often surprised because the authors obviously rely only on old archived reports, on rumors, and on their own and other people's conjectures. I would think that any historian who wants to describe episodes that occurred decades before his or her own time would be eager to talk to older people who were eye and ear witnesses of, and even active participants in the events these young authors

Names:

Christenson, Dave Dooling, Dave Huzel, Dieter

Places:

Huntsville, AL

Types:

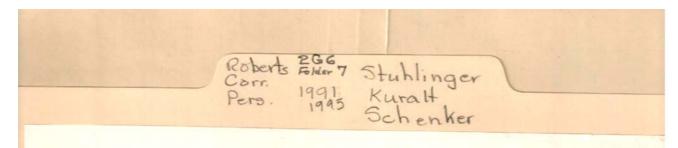
correspondence

Dates:

Dec 26, 1995

Rees, Eberhard Reisig, Gerhard, Dr. Roberts, Frances, Dr. Stuhlinger, Christoph Stuhlinger, Irmgard Stuhlinger, Tilman von Braun,

Image 2 r02g06-07-000-0033 <u>Contents</u> <u>Index</u> <u>About</u>



are planning to describe. In Huntsville, numerous such witnesses had been available during the past 45 years. Wouldn't it have been almost ideal if a young historian and one or more of the old team members had joined forces, and had written jointly an essay about these times 50 years ago which were so totally unusual, so bizarre and chaotic, so extremely difficult to understand even for those who had to live and to work through them - let alone for those who grew up under "normal" conditions, well protected and supported by a country whose government granted a maximum of freedom and respect for the individual, and who had been spared the fate of ever living under a ruthless dictatorship? - Unfortunately, the opportunities for such a joint, authentic essay are now lost forever; instead, these young writers simply declare the memoirs of the oldtimers as "self serving, excusatory, controversial, and not truthful".

You asked whether I'm planning to write my own memoirs. - Our original manuscript of the von Braun book contains a number of episodes out of my own life and work; however, the publisher decided to shorten our manuscript by almost 50 percent, and much of the material about my own experiences fell under the table. As an example, I enclose the copy of one chapter not printed in our book ("Scientists Under Moral Conflict"). Other chapters that were either omitted or drastically shortened include the following: "Peenemuende: Reminiscenses of Pfc. Ernst Stuhlinger"; "Von Braun's Mittelwerk Connection"; "Twelve Men on the Moon". A number of passages describing von Braun's own thoughts, convictions, statements, and actions were also omitted. - There may be an opportunity in the future to publish some of these texts, and some further material of a similar nature still to be written, but I have no intent to write my own memoirs beyond such short and selected pieces.

Frances, this has become a long letter, augmented by a large bundle of reading material. Please, don't feel rushed! Some of the material is for you to keep, other pieces I would like to have back when you don't need them any longer. I will undergo a knee replacement operation on January 16, to be followed by several weeks of convalescence, so it will be some time before I'm back in functional condition.

With warmest regards

Erus.

Names:

Stuhlinger, Ernst

von Braun,

Places:

Huntsville, AL

Types:

correspondence

Dates:

Dec 26, 1995

Image 3 r02g06-07-000-0034 <u>Contents</u> <u>Index</u> <u>About</u>

Roberts 266 Corr. 1991 Kuralt Pers. 1995 Schenker

FRANCES,
YOU MAY KEED
THIS.
FOURT.

December 14, 1995

Dr. Ernst Stuhlinger 3106 Rowe Drive SE Huntsville, Alabama 35801

Dear Dr. Stuhlinger,

This is a very belated reply to your response to my article on you Braun in the <u>Huntsville Times</u> earlier this autumn. I apologize for the tardiness; it has been a busy semester.

Let me begin by thanking you for writing such a thoughtful and reasonable essay. I recognize that on many points we are in complete accord: that you be also a gifted scientist and engineer, that he never wanted to be perceived as a hero, and that it is difficult to pass judgment on events now fifty years in the past. To be honest, my guarrel was less with you Braun than with the Huntsville Times whose editors should know better than to contribute to the mythologizing of you Braun that has turned him into a hero, or even a saint. I understand why this has happened. You Braun was a man who came to a relatively underdeveloped part of the country and quickly demonstrated a genius for getting things done. People were naturally awed by his accomplishments and charmed by his personality.

I am not a student of World War II and am not in a position to evaluate some of the charges that have been made against von Braun over the years. I am perfectly willing to believe, however, that von Braun had little or no interest in Nazism, and that he never intended that his rockets be used as weapons. No doubt if von Braun had been more fortunate and had been born in a more peaceful time and place in history his rockets would never have gone anywhere except into space.

Sadly, things did not work out that way. What continues to bother me as I think about von Braun is this: he seems never to have acknowledged that scientific research always occurs in a social and political context which the scientist must take into account. Von Braun was an idealist who wanted to go to the moon, but as you note in your biography of him, during the 1930s the only organization willing to support this kind of activity was the German military. Of course, they didn't care about the moon, and if von Braun was a reasonably intelligent man he must have known this -- known that at some point his work would be put to military ends. Through about 1940 one might have reasoned that the goal of military research was the defense of the German nation, but after the attack on the Soviet Union, only the most naive observer could fail to see Hitler's intention of world conquest.

Names:

Roberts, Frances, Dr.

Stuhlinger, Ernst, Dr.

von Braun,

Places:

Huntsville, AL

Types:

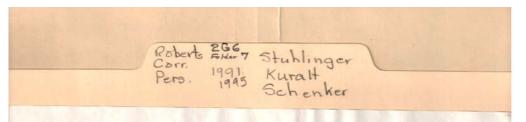
correspondence

memo

Dates:

Dec 14, 1995

Image 4 r02g06-07-000-0035 <u>Contents</u> <u>Index</u> <u>About</u>



I have always dreamed of a von Braun who somehow restrained his genius during the war in the manner of Wernher Heisenberg who apparently elected not to give his all to the German nuclear program. Your article disturbs me because it suggests that such minimal passive resistance would never even have occurred to von Braun. Instead, you say that work on such matters as improved guidance systems for the V-2 was justified by the fact that your efforts were "typically of a long-range nature." Besides, you say, everyone hoped that the war would be over before the things were actually used in combat. (Thus you describe in your biography von Braun's distress when he heard about the first V-2 attacks in September 1944.)

For me this is the crux of the matter. A scientist cannot simply declare that whatever he does is justified on the grounds that it serves some high ideal. In effect what you say is that in 1944-45 it was morally acceptable that some people die as victims of Nazi terror so that possibly two or three decades hence men could walk on the moon. The Greeks had a word for this: hubris. It's also hard for me to understand how you could be working on a device that you knew to be a weapons system (though you might have privately wished it was a moon rocket) that could have extended the length of the war at the very same time you looked to the rapid ending or the war as a means of avoiding the immediate and deadly consequences of your technical success. Actually, I can see how someone might have thought this way at the time, but surely after half a century this must appear for the rationalization that it always was.

I alluded in my article to the novel Frankenstein, whose protagonist more and more reminds me of von Braun. Victor Frankenstein, too, had only the finest ideals in mind as he pursued his research. He had not an evil bone in his body. He even dreamed that his work might one day free man from the curse of mortality. But the lesson of shelley's fable is that science is too potent a force to be pursued single-mindedly in some kind of social and political vacuum. The scientist must in fact be more astute than the rest of us precisely because his work has foreseen and unforeseen consequences for so many people.

Part of my learning about von Braun included reading Albert Speer's Inside the Third Reich. Von Braun and Speer had many things in common. Both were technically brilliant in their chosen fields, and both wanted to focus on their professional interests without bothering much with politics. One theme of Speer's work is that this lack of concern with politics was a horrible mistake. He ends his autobiography with these words: "Dazzled by the possibilities of technology, I devoted crucial years of my life to serving it. But in the end my feelings about it are highly skeptical." Speer had twenty years in Spandau prison to reflect upon his actions in the war, and his bitterness is not surprising. But what finally emerges is the portrait of a man who learned the hard way that people always come before things. When you say today that the von Braun team's work on the V-2 was justified because all you really cared about was building

Names:

Heisenberg, Wernher

Speer, Albert

von Braun,

Places:

Huntsville, AL

Types:

correspondence

Dates:

Dec 14, 1995

Image 5 r02g06-07-000-0036 Contents Index About

Roberts 266 7 Stuhlinger Corr. 1991 Kuralt Pers. 1995 Schenker

December 27, 1995.

or. David Schenker
College of Liberal Arts
Department of English
The University of Alabama in Hunteville
H u n t s v i 1 l c , AL 35899

Dear Dr. Schenker,

thank you for your letter of December 14. I'm trying to answer it with the hope that my reply will contribute to a better mutual understanding.

Next February, it will be 50 years that I set foot in this great country. During this past half century, I set thousands of American-born sen and women, some of them good neighbors, many of them colleagues and co-workers. With hundreds of them, a spontaneous, honest and ware friendship developed which will stand the test of time. These experiences gave us the firm conviction that the mental and spiritual makeup of young, and even older people in the USA and is Germany is very similar - a situation that should not be surprising considering the fact that Germany, during the past 300 years, has been the atrongest supplier of immigrants to America among all the many nations from which people emigrated to find a new home on this continent.

The difference between young Germans of the 1930s and '40s and young Americans of the 1980s and '90s lies in the very different "environmental conditions" under which they had to live and to work. Some of the members of the young generation of American descont claim that the young Germans of 50 years ago should have acted differently, and they derive from that claim bitter accusations against their German-born colleagues. What is so very depressing for as former Germans is not so such the personal attack by some American-born contemporaries, but rather their unwillingness to hear and learn about the real facts and experiences from persons who lived before, through, and after those 12 dramatic years of Nazi dictatorship in Germany. Instead, they use archived documents, written either by Eazi officials, or for the consumption of Nazi officials, and therefore of very questionable value for historical researchars; they also rely on unfounded rumors, and on their own and on other people's conjectures. It is not surprising that they arrive at conclusions that differ widely from the historical facts.

For the past 45 years, there lived and worked in Buntsville numerous former Peenemmenders who would have been quite willing to chert the memories of their experiences with American-born neighbors and colleagues interested in German past history. On our part, we would have welcomed open-minded, honest conversations of this kind about many subjects, but particularly about two very crucial questions: first, what did you, Ernst Stublinger and others like you, do and not do during these twelve years? - and second, what would you, David Schenker and others like you, have done in our place? - I would have been very willing to enter even into lengthy conversations of this nature; would you? - I believe that it would have set a few things right which are still very wrong today.

You wrote in your latter that you would have preferred a world with no

Names:

Schenker, David, Dr.

Stuhlinger, Ernst

Places:

Huntsville, AL

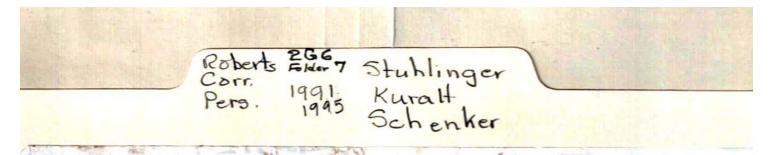
Types:

correspondence

Dates:

Dec 27, 1995

Image 6 r02g06-07-000-0037 <u>Contents</u> <u>Index</u> <u>About</u>



Moon landings, but the heroic story of a brilliant scientist who in some small but unmistakable way said "no" to a tyrant. - Even this statement alone shows the urgent necessity of a conversation as suggested above. I believe that all of us who are alive today, rather than accusing the wrong people for past criminal actions, should endeavor jointly to build a better world for the future - a future that evoids the blind batted that is one of the most forceful elements in human nature that eventually leads to war.

Rather than soing into more details in this letter, I would like to conclude with a quote from Winston Churchill, a man who knew far more about war and peace, and about the affairs of men, than both you and I will ever know. — It was fortunate, he said, that the Germans concentrated the work of so many scientists and engineers on their rocket project in Peenemuende; if they had not, all these people would have built fighter planes, bombers, and submarines, and far more people on both sides would have died, more cities would have been destroyed, and the war would have lasted far longer..

With sincere regards

Names:

Churchill, Winston

Places:

Huntsville, AL

Types:

correspondence

Dates:

Dec 27, 1995

Image 7 r02g06-07-000-0038 <u>Contents</u> <u>Index</u> <u>About</u>



36

3 - Scientists Under Moral Conflict

At the outskirts of the city of Bergen in Norway, there is a mountain, Floeyen, with a magnificent view over the city, the Vaagen Fjord, and the islands, "spreading out like dark gems on a silver platter ocean of glassy water" — in the words of von Braun's friend and traveling companion Erik Bergauet [1-20], a native Norwegian and, like von Braun, a naturalized American citizen. When Bergaust and von Braun visited Floeyen in the early '70s, von Braun stopped in front of a tall granit monument commemorating the Bergen youths who gave their lives during the war against the German occupation forces. Looking first at the monument, and then at all this splendor around him, von Braun said to his friend: "You know, if this had been my country, I certainly would have defended it myself against any aggressors and invaders..."

This was one brief moment during a vacation trip overly filled with action, but it afforded a glimpse at one compartment in von Braun's mind which was not always visible to everybody, but which never loosened its relentless grip on his conscious ever since von Braun realized that his rocket may be used not — as it had been conceived — as a defense weapon in a traditional army arsenal, but as a missile in a war of aggression that his own government had begun to wage.

Topics:

by Ernst Stuhlinger

p. 1

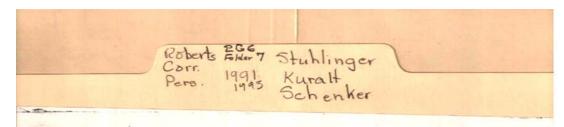
Names:

Bergaust, Erik

Scientists Under Moral Conflict von Braun,

Types:

Image 8 r02g06-07-000-0039 <u>Contents</u> <u>Index</u> <u>About</u>



37

Von Braun wanted to develop rockets for space exploration. In 1932, the desire of his country's army to be prepared for defence offered the financial means for this development. The following year, Hitler began to establish his dictatorship; thereafter, everything changed. Against von Braun's will, and against his efforts and power, his rocket was turned into a weapon of aggression.

Could he have prevented this flow of events? Should he have totally desisted from developing rockets? Should he have laid his hands down in 1933? If he had never started building rocket motors back in 1931, how much of the cataclysm of the '40s would have been avoided? What should he have done differently? -- There were questions without end...

Von Braun did not talk often about such thoughts, but those who were close to him knew that they haunted him persistently, at least deep down in his own inner world. On some occasions, he spoke or wrote about those questions. He knew very well that others, in fact all of those who are driven by a creative spirit to invent and develop new ideas in science and technology, sooner or later find themselves confronted with the same tragic dilemma. They come to a crossroad; however, it may turn out to be a crossroad that does not leave room for a wilful choice, but heads off with irresistible force in only one fateful direction.

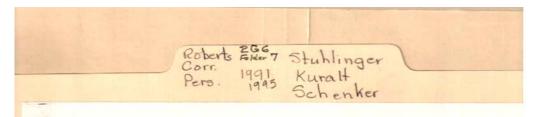
p. 2 Names:

Hitler

Scientists Under Moral Conflict von Braun,

Types:

Image 9 r02g06-07-000-0040 <u>Contents</u> <u>Index</u> <u>About</u>



38

History teaches us that creative work in science and technology has always been in danger of leading into moral conflict. The more our civilization progresses, the lesser are the chances for escape. Donald Tarter, professor of sociology at the University of Alabama in Huntsville, conducted a study of this conflict situation by comparing two great scientific-technological developments of the past war: The rocket team in Peenemuende, and the atomic energy team in Los Alamos. together", he writes [1-21], "the contributions of these teams post-war capability for intercontinental nuclear warfare ... This was an end result which was completely at variance with the original purpose of the careers in science and technology members of these two groups had anticipated in their earlier The young men who were later to go to Peenemuende and begin the age dreamed of interplanetary space flight ... Likewise, as youths, the men who were to go to Los Alamos to begin the atomic age had their own captivating visions that stirred within them ... "

There are a number of parallels between the two teams, but there certainly are also profound differences. The moral conflict may be viewed differently in both cases, but it was definitely there, and it was deeply felt by members of each team. Its manifestation may even have been more dramatic in the case of the atom scientists, in the United States as well as in Germany where an atomic energy program was underway from 1939 till 1945.

Von Braun had known during the war years in Germany that

p. 3 Names:

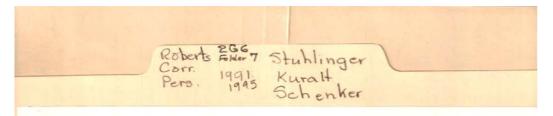
> Peenemuende & Los Alamos

Tarter, Donald E.

Scientists Under Moral Conflict von Braun,

Types:

Image 10 r02g06-07-000-0041 <u>Contents</u> <u>Index</u> <u>About</u>



39

physicists in various countries were working on the development of an atomic bomb of unprecedented destructiveness. Open discussions were not permitted, but the fact was known at least to those who had contact with scientists at universities and research institutes. The bombs of Hiroshima and Nagasaki in the summer of 1945 took the lid of the secret.

One of the first books von Braun acquired and read after his arrival in the United States in the fall of 1945 was the famous Smyth Report, "Atomic Energy for Military Purposes" [1-22], written in the summer of 1945 and published soon afterwards. Von Braun's burning interest in the American atomic energy project was two-fold: The science and technology of the fission process, and the personal thoughts of the scientists and engineers who worked on the development of the bomb. Many of the scientists behind the project whose names became known through the Smyth Report and other publications were well-known personalities at German universities and research institutes during pre-war years. In fact, as Eugene P. Wigner mentioned in a conversation many years later, during the early beginnings of the project in Los Alamos most of the internal notes and reports between the laboratory chiefs were written in German, because that language could be understood by the largest number of top scientists.

During his first years in the United States, von Braun had almost no opportunities to talk with scientists that had been involved in the

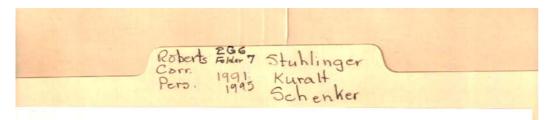
p. 4 Names:

> Smyth Report Wigner, Eugene P.

Scientists Under Moral Conflict atomic bomb von Braun,

Types:

Image 11 r02g06-07-000-0042 <u>Contents</u> <u>Index</u> <u>About</u>



atom bomb project. He read as many reports and essays about the aspects of that project as he could. Later, when he met with and more engineers, scientists, politicians, industrialists, and military people, he tried to find out how the 'colleagues in Los Alamos' managed to cope with the burden of the moral conflict. Von Braun's associate Stuhlinger had been a member of the German atomic energy project under Werner Heisenberg before he was drafted into the Army in 1941. Von Braun was greatly interested in Stuhlinger's experiences during those years, particularly in Heisenberg's personal attitude toward the development and use of nuclear bombs (described later in this chapter). He must have felt a kind of compassion, a man-to-man understanding for the plight of the scientists and engineers who were to develop a weapon of unbelievable destructive power. Occasionally, he formulated his thoughts in speeches and essays. When he talked with his close associates, he always impressed by his familiarity with the history of the atom bomb, with many of its scientific and technical details, with the names of the people participated, and even with some personal attitudes of the main players of this dramatic phase of human history.

Otto Hahn and Fritz Strassmann in Berlin discovered the splitting of uranium nuclei by neutrons late in 1938. Immediately following their discovery, many physicists all over the world turned their attention to nuclear fission, intrigued by the enormously exciting prospects of unravelling new mysteries of atomic nuclei, and even of

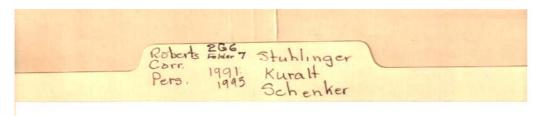
p. 5Names:

Hahn, Otto Heisenberg, Wernher Strassman, Fritz Stuhlinger, Ernst Scientists Under Moral Conflict von Braun,

40

Types:

Image 12 r02g06-07-000-0043 <u>Contents</u> <u>Index</u> <u>About</u>



41

nuclear energy available on a macroscopic scale. The release of neutrons in every fission event was detected, and the of a chain reaction, leading to the liberation of quantities of energy, became obvious simultaneously to many researchers. As early as January, 1939 Otto R. Frisch and Lise Meitner mentioned this aspect of nuclear fission to Niels Bohr in Copenhagen, who in turn discussed the possibilities of a chain reaction with Enrico Fermi and other colleagues in the United States. By March, 1939 Fermi had worked out the basic theory of a controlled large-scale nuclear reaction. A group of scientists gathered around him and began to probe more deeply into the problems of generating and controlling a nuclear chain reaction, among them Leo Szilard, Victor Weisskopf, Eugene P. Wigner, Edward Teller, and George B. Pegram; they were joined later by Gregory Breit, Harold C. Urey, Emilio Segre, Prisch, Meitner, Hans Bethe, J. Robert Oppenheimer, Stanley Ulam, and others.

while Fermi's uranium-splitting team formed in the United States, a very similar process occurred in Germany. Heisenberg was the center of the action. A loosely organized Uran Verein (uranium club) developed; its members included Hahn, Erich Rudolf Bagge, Karl Friedrich von Weizsaecker, Max von Laue, Hans Geiger, Gustav Robert Doepel, Karl Wirtz, Kurt Diebner, Otto Haxel, Siegfried Fluegge, Walther Bothe, Helmut Volz, Paul Harteck, Hans Jensen, Klaus Clusius, Walter Gerlach, and others.

During the summer months in 1939, Heisenberg gave a series of

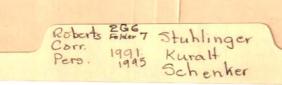
p. 6 Names:

Bagge, Erich Rudolph Bethe, Hans Bohr, Niels Bothe, Walther Breit, Gregory Clusius, Klaus Diebner, Kurt Doepel, Gustav Robert Fermi, Enrico Fluegge, Siegfried Frisch, Otto R. Geiger, Hans Gerlach, Walter Hahn, Otto Harteck, Paul Haxel, Otto Heisenberg, Wernher Jensen, Hans Meitner, Lise
Oppenheimer, J.
Robert
Pegram, George B.
Segre, Emilio
Szilard, Leo
Teller, Edward
Ulam, Stanley
Urey, Harold C.
Volz, Helmut

Weisskopf, Victor Wigner, Eugene P. Wirtz, Karl Scientists Under Moral Conflict von Laue, Max von Weizsaecker, Karl Friedrich

Types:

Image 13 r02g06-07-000-0044 Contents Index About



42

lectures on quantum theory at the universities of Chicago and Ann Arbor. At that occasion, he had a long conversation with his old friend Fermi, whom he quotes as follows [1-23]: "We know that the process of nuclear fission, discovered by Otto Hahn. may lead to a chain reaction...and possibly could be used for machines or atom bombs. In times of war, this technical development would probably be pursued vigorously by both sides. Nuclear physicists would be directed by the governments of the countries in which they lived to take part in this development..." — Two weeks after Heisenberg had returned to Germany, World War II broke out.

In retrospect, it is impressive to see how closely the two research programs by Fermi in the United States and Beisenberg in Germany parallelled each other, although they proceeded independently. Both groups found out that U-235 is the isotope that incurs fission with slow neutrons, and that U-238, after absorbing a neutron, undergoes a two-step transformation into plutonium (called simply "transuranium 239-94" by the Germans) that will also split after absorbing a slow neutron. The need for a moderator, the layered or modular structure of a "pile", the necessary enrichment of the fissionable isotope, and many other details became known on both sides of the Atlantic at about the same time.

In March, 1939 Pegram contacted the Navy in an effort to obtain military support for the program, but Navy officials showed no active interest [1-24]. Four months later, Szilard and Wigner tried their

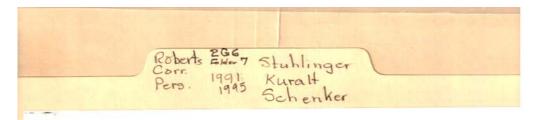
p. 7 Names:

> Fermi, Enrico Hahn, Otto

Heisenberg, Wernher Pegram, George B. Szilard, Leo Wigner, Eugene P. Scientists Under Moral Conflict

Types:

Image 14 r02g06-07-000-0045 <u>Contents</u> <u>Index</u> <u>About</u>



43

luck directly with the President. Wigner described this action in a note of February 26, 1968 [1-25]:

February 26, 1968.

"The following are my recollections of the history of Einstein's letter to President Roosevelt drawing attention to the importance of research on uranium fission.

"Szilard and I were hardly through with our explanation of the significance of nuclear energy in general and of nuclear weapons in particular when Einstein grasped the full significance of the development. He was at once ready to attempt drawing the attention of the Government and of President Roosevelt to the importance of the U.S. not staying behind in exploring the possibilities of nuclear energy and nuclear weapons. He dictated a letter to President Roosevelt which I took down in longhand. I remember how surprised I was that he could formulate his thoughts so quickly and precisely.

"My notes of the letter were taken back to Princeton where I translated them [from German] into English. The typed translation was then brought to Einstein's house on Long Island by Teller and Szilard a couple of weeks later, and Einstein signed it. It was presented to President Roosevelt not much later by Alexander Sachs."

Signed: E.P. Wigner

p. 8 Names:

> Einstein, Roosevelt, President

Sachs, Alexander Szilard, Leo Teller, Edward Wigner, Eugene P. Scientists Under Moral Conflict

Types:

Image 15 r02g06-07-000-0046 Contents Index About



44

Einstein's famous letter of August 2, 1939 to President Koosevelt became an historical document [1-26]. After mentioning Fermi's and Szilard's recent work with uranium, Einstein wrote: "Certain aspects of the situation which has arisen seem to call for watchfulness and, if necessary, quick action on the part of the Administration...", and he stated that "...extremely powerful bombs of a new type may thus be constructed..."

President Roosevelt took this recommendation to heart. In his reply to Einstein of October 19, 1939 he stated that he had "convened a board consisting of the head of the Bureau of Standards and a chosen representative of the Army and Navy to thoroughly investigate the possibilities of your suggestion regarding the element of uranium..."

After this exchange, the American atomic energy program went into high gear. Although there were numerous steps of reorganization during the following months and years, the "Manhattan District Project", as it was called from June 1942 on, progressed quickly toward its goal, the nuclear bomb.

In Germany, the atomic energy program took a different course. A few months after the time when Einstein had recommended "quick action" to the American Government, Heisenberg addressed the members of the

p. 9 Names:

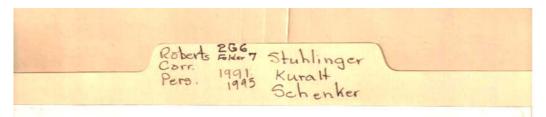
> Einstein, Fermi, Enrico

Heisenberg, Wernher Roosevelt, President Szilard, Leo

Scientists Under Moral Conflict

Types:

Image 16 r02g06-07-000-0047 <u>Contents</u> <u>Index</u> <u>About</u>



45

Dran Verein in one of their frequent meetings. That talk will always be remembered by those who attended the meeting. All these "uranium meetings" were highly classified; no records were taken, and Heisenberg's words can only be reported from memory. Stuhlinger worked at that time as a nuclear physicist under Hans Geiger at the Berlin Technical University. He was a member of the Uran Verein, and he attended Heisenberg's meeting on that particular day. Here is approximately what Heisenberg said:

"It is very likely now that a chain reaction can be initiated in uranium, provided only that a sufficient amount and density of the fissionable isotope is available. Principally, two kinds of chain reactions are possible, a "slow" one in which the production of neutrons from splitting nuclei is controlled by moderating, i.e. neutron-absorbing materials in such a way that the rate of fission processes is kept on a constant level. This reaction process will provide a continuous, controllable source of heat energy. The other kind of chain reaction, a "fast neutron process", occurs when a sufficiently large and dense amount of fissionable material starts a chain reaction without moderating material around. In that case, the rate of reaction increases very quickly in exponential fashion. An explosion results with an amount of energy release which surpasses any kind of explosive reaction we have known so far. In fact, a nuclear explosion of this kind would be just borrible to the highest degree.

"As scientists", he said, "and as responsible humans, we should not

p. 10Names:

Geiger, Hans Heisenberg, Wernher Stuhlinger, Ernst

Scientists Under Moral Conflict

Types:

Image 17 r02g06-07-000-0048 <u>Contents</u> <u>Index</u> <u>About</u>



46

work on the development of a nuclear bomb. Its effect would be too terrible. We should keep our hands off. Working on a controlled chain reaction will be alright; if successful, it will lead to a new kind of energy source without the obvious limitations of conventional oil or coal energy sources. One can operate ships with such nuclear power plants, and one can generate vast amounts of electric energy with stationary nuclear plants. I don't believe that controlled nuclear energy will become available before the end of the war, but it will certainly be of great benefit to mankind in the more distant future...

"Besides", he continued, "the technical effort to create a bomb, which will include the need for isotope separation on a large scale, would far exceed the cost our country could afford to pay. It would be a hopeless beginning. This argument alone will suffice to make our Government decide against an atomic bomb program."

This attitude of Heisenberg toward the nuclear bomb, which met with the full consent of his coworkers, is corroborated by a passage in the memoirs of Albert Speer, Minister of Armaments and Munitions in Germany [1-27]. Speer met with Heisenberg and other scientists in Berlin in June, 1942 to discuss the status of their uranium fission research. "On the suggestion of the nuclear physicists", he wrote with reference to that meeting, "we discarded plans to build an atom bomb already in the fall of 1942. After my repeated question for the development time I was told that one could not count on it earlier than in three to four years. By that time, the wer had to be over-

p. 11Names:

Heisenberg, Wernher Speer, Albert Scientists Under Moral Conflict

Types:

Image 18 r02g06-07-000-0049 <u>Contents</u> <u>Index</u> <u>About</u>



Instead, I gave permission to develop an energy-producing uranium reactor for the operation of machines in which the Navy was interested in connection with submarines." 47

Elisabeth Heisenberg, in a book about her husband [1-28], referred to the same meeting in Berlin of which Heisenberg had told her. When he mentioned that it was now certain that a bomb could be built, she was deeply shocked and asked: "And what will you do if they force you to build atom bombs?" He replied calmly: "Don't worry. We will not build an atom bomb. Building atom bombs would be a gigantic project that would take years to accomplish. We are protected here by an order of Hitler himself which says that no projects must be undertaken whose completion would take longer than half a year... We are fortunate indeed that we don't have to make that decision..." (Translated by E.St.).

The Uran Verein was permitted to continue its work on a controlled nuclear reaction for an energy-producing plant, but it was on a very modest scale with little support. Funds were scarce, manpower was limited, and priorities at industrial plants were lower than those assigned to other projects. When the war ended, Allied troops found a nuclear reactor in the making in an underground facility near Haigerloch in southern Germany. It was almost completed, but it had not yet reached the point where the production of energy could be demonstrated on a large scale.

p. 12Names:

Heisenberg, Elisabeth Heisenberg, Wernher Hitler,

Scientists Under Moral Conflict

Types:

Image 19 r02g06-07-000-0050 <u>Contents</u> <u>Index</u> <u>About</u>



48

While the German atomic energy program lingered along, work in Peenemuende proceeded at a fast pace. As word of a possible nuclear energy source spread around, von Braun visited Heisenberg in Berlin asked him the simple question: "Can nuclear energy be applied to a rocket motor?" -- The two men must have had a very spirited conversation; back in Peenemuende, von Braun told his coworkers: "I had expected to find a man totally removed from the real world, terms. Instead, there was a young man full of vigor, talking first about skiing and music, and then changing quickly to ships and submarines, turbines, gear boxes, steam boilers, heat exchangers, modelling. control rods. thermal high-temperature metals and ceramics, and about large-scale stationary nuclear-electric power plants for the time after the war had ended...

"We talked at length about atomic energy rockets. Professor Heisenberg seemed to know all about design and control of the atomic energy source, and I contributed details of the rocket principle. We came to the conclusion that nuclear rockets should be feasible; however, severe problems would have to be solved before a nuclear rocket could be made to work efficiently and reliably. The propellant gas would flow through pipes or channels in the reactor core where it would absorb heat energy. It must obtain a high exhaust velocity to make the rocket efficient, particularly in view of the very heavy mass of the nuclear reactor, so its temperature must be very high. The temperature of the pipe walls must be even higher to assure sufficient

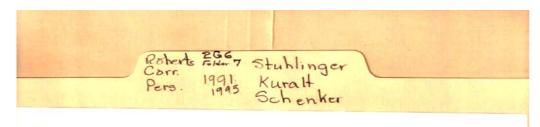
p. 13Names:

Heisenberg, Wernher

Scientists Under Moral Conflict von Braun.

Types:

Image 20 r02g06-07-000-0051 <u>Contents</u> <u>Index</u> <u>About</u>



heat transfer into the fast-moving gas. The required temperatures of the reactor structure are so high that they exceed the limits of what present-day materials can stand, and this is the reason why efficient and reliable nuclear rockets do not seem possible to be developed in the near future."

Fermi's atomic energy program proceeded quickly, enjoying generous support from the Government, and enthusiastic cooperation of a number of scientific institutions in the United States. A group of high-ranking scientists agreed to an isolated life in a laboratory on a lonely mesa near Los Alamos in New Mexico. On December 2, 1942 the first test reactor built by the Manhattan Project in Chicago went critical. It was kept very cautiously on a power level of 0.5 watts for ten days, and then stepped up to 200 watts. During the following two years, J. Robert Oppenheimer led the effort to construct the real bomb. As the time of its completion approached, some of the scientists began to fear that the decision to actually drop the bomb might be taken out of their hands. What they had begun in the spirit of scientific research, and in an honest attempt to restore and maintain peace, might turn out to be a horrible tool of destruction over which they could not exercise the slightest control.

Again, Szilard took the front stand in an attempt to avert what he, and many of his colleagues, considered an extremely unfortunate course of events. He wrote "A Petition to the President of the United States" [1-29]; it was signed by 67 scientists working in the Manhattan

p. 14Names:

Fermi, Enrico

Oppenheimer, J. Robert

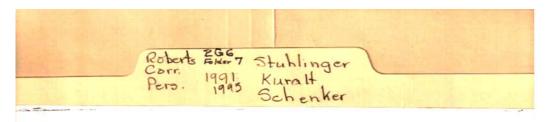
Szilard, Leo

Scientists Under Moral Conflict

五十

Types:

Image 21 r02g06-07-000-0052 <u>Contents</u> <u>Index</u> <u>About</u>



50

Project. Einstein again transmitted the petition to President Roosevelt. In his accompanying letter of March 25, 1945 [1-30], Einstein wrote, after referring to his previous letter of August 2. 1939: "...Dr. Szilard...is now greatly concerned about the lack of adequate contact between scientists who are doing this work and those members of your cabinet who are responsible for formulating policy..."

Szilard's petition to President Roosevelt is an impressive testimony to the grave concern of the nuclear scientists that their discovery, exploited for military purposes, may lead to untold human suffering and tragedy. Their efforts to prevent this, described in great detail in Rhodes' book [1-31], remained without the desired results. Scientists and politicians did not see eye-to-eye.

The first nuclear bomb was ready for testing on July 16, 1945. In the early morning hours on that day, it was detonated in the desert lands of New Mexico. Three weeks later, two bombs were dropped on two luckless cities in Japan, and World War II came to an end.

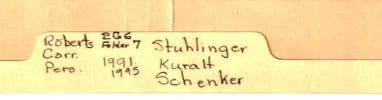
Heisenberg, as well as Hahn, von Weissaccker, and numerous other German scientists were prisoners of war in southern England when they learned of the Hiroshima bomb on August 6, 1945. "At first", Heisenberg wrote [1-32], "I couldn't believe the news, because I was sure that the production of atom bombs would require a terrific effort... Also, I thought that it would not be plausible to assume

p. 15Names:

Einstein, Hahn, Otto Heisenberg, Wernher Roosevelt, President Szilard, Leo Scientists Under Moral Conflict von Weizsaecker, Karl Friedrich

Types:

Image 22 r02g06-07-000-0053 <u>Contents</u> <u>Index</u> <u>About</u>



51

that the nuclear physicists of the United States whom I knew so well should have given their fullest support to such a project...

"Understandably, Otto Hahn was hit hardest by the news. Nuclear fission of uranium was his greatest scientific discovery; it was the decisive, but also totally unforseen step in the development of nuclear technology. And this step had caused now the end of the life of a great city and its population — unarmed, innocent people. Most of them had absolutely no part in the war... Hahn went to his room, shaken and deeply disturbed. We were utterly worried about him..."

Whose fault was it? Who was to blame?

Von Weizsaecker tried to formulate an answer. — "Does Hahn have more reason to feel guilty than any one of the rest of us who contributed to the progress of nuclear physics? Are we all guilty? What is our guilt? What could we have done differently?

"Naturally, there will be radical minds now who believe that this process of scientific development must be stopped completely because it might lead to other such catastrophes... However, these people don't realize that in today's world peoples' lives depend entirely on this process of continuing development. If the constant extension of our scientific and technical knowledge were discontinued abruptly, the number of people who can live on Earth would shrink drastically within a short time, leading to catastrophes at least as horrible, if not

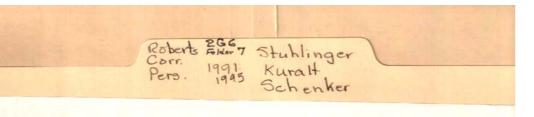
p. 16 Names:

Hahn, Otto

Scientists Under Moral Conflict von Weizsaecker, Karl Friedrich

Types:

Image 23 r02g06-07-000-0054 <u>Contents</u> <u>Index</u> <u>About</u>



worse than those caused by the atomic bomb."

Soul-searching talks of the physicists in the prison camp continued over long hours, days, and weeks. — "After the war with Germany had ended", Heisenberg said, "many physicists in the United States probably advised their Government not to use this weapon, but at that time they had no longer any influence. It is not up to us to raise any criticism here..."

Indeed, Einstein's reaction to the bombs over Japan were similar to those of his colleagues in Germany.

"Oh weh!" ["Alas!"] -- he exclaimed when he learned about the bomb in Hiroshima [1-33]. Much later, in 1954, he said to Linus Pauling: "I made one great mistake in my life when I signed this letter to President Roosevelt recommending that atom bombs be made".

What was Einstein's role in the American nuclear energy program that led to the atomic bomb?

Many essays and books describing this epic program were written during the past forty years, probably the best and most thorough among them, "The Making of the Atomic Bomb", by Richard Rhodes [1-34]. Details about Einstein's part in that program can also be found in "Einstein, The Life and Times" By Ronald W. Clark [1-35]. As Einstein's life and work during these crucial years from 1939 till 1945 unfold, it becomes almost painfully evident how difficult, if not

p. 17Names:

Clark, Ronald W. Einstein,

Types:

essay

Heisenberg, Wernher Pauling, Linus Rhodes, Richard Roosevelt, President Scientists Under Moral Conflict

52

Image 24 r02g06-07-000-0055 <u>Contents</u> <u>Index</u> <u>About</u>



tween

53

impossible it must be for a creative scientist to find his way between good and evil, between right and wrong, between the roles of savior and destroyer.

Although an avowed friend of humanity and a fervent pacifist who hated everything militaristic, Einstein encouraged President Roosevelt to develop nuclear weapons in 1939. The following year, he urged "that conditions should be created for extensive acceleration [of the nuclear work at Columbia]", and that "force should be met by force". Alexander Sachs [1-36] stated that in 1940 "Dr. Einstein and myself were dissatisfied with the scope and the pace of the work and its progress". Frank Aydelotte [1-37], in 1941, wrote to Vannevar Rush, referring to Einstein: "I know how deep is his satisfaction at doing anything which might be useful in the national effort". In reply to a student's letter, Einstein wrote that he had given up pacifism, and that "organized power can be opposed only by organized power" [1-38].

At around that time, in October 1941, Heisenberg paid the now-historic visit to Niels Bohr in Copenhagen where he showed his old friend a drawing of the German plans for a heavy water reactor in which the chain reaction of uranium fission was to be demonstrated. He "saw himself confronted with the specter of the atomic bomb, and he wanted to signal to Bohr that Germany neither would nor could build a bomb", Heisenberg's wife wrote in 1984 [1-39]. Those who knew Heisenberg during the war years felt that he even wanted more: He wanted to build a bridge, however tenuous at first, from friend to

p. 18Names:

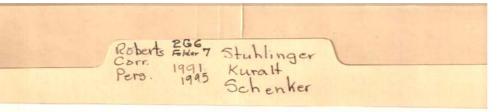
Aydelotte, Frank Bohr, Niels Bush, Vannevar

Types:

essay

Einstein, Heisenberg, Wernher Roosevelt, President Sachs, Alexander Scientists Under Moral Conflict

Image 25 r02g06-07-000-0056 Contents Index About



54

friend, from scientist to scientist, a bridge that would eventually offer a chance to avert the terrible catastrophe whose apocalyptic shadow he saw spreading over mankind.

Bohr neither believed, nor even trusted his friend of many years. Their conversation ended in failure. "Heisenberg was deeply shocked by Bohr's reply", his wife wrote. He found himself in "a state of confusion and despair". His last sliver of hope had been lost...

Oppenheimer later wrote that Bohr showed indignation that Heisenberg would think that Bohr might be willing in any way for any reason to cooperate with Nazi Germany. In turn, Heisenberg, as his wife wrote, was aghast that Bohr would fail to understand that his "bond to his country and his people was not tantamount to a bond to the regime".

Einstein's role in the actual development of nuclear weapons was always limited, but, as Bush reported in 1943 [1-40], "...he was disturbed because he was not active in the war effort". On the other hand, Einstein wrote in a letter to Dr. Gustav Bucky [1-41] in July, 1943: "So long as the war lasts and I work for the Navy, I do not wish to begin anything else". Einstein worked on a theory of explosions at that time.

After the Hiroshima and Nagasaki bombs had been dropped, the White House in a press release called the atomic bomb "...the greatest

p. 19Names:

Bohr, Niels Bucky, Gustav, Dr. Bush, Vannevar Einstein,

Heisenberg, Wernher

Oppenheimer, J. Robert

Types:

Image 26 r02g06-07-000-0057 <u>Contents</u> <u>Index</u> <u>About</u>



achievement of organized science in history" [1-42].

The immediate reactions of the scientists in the Manhattan District Project were different [1-43]:

Kenneth Bainbridge: "Now we are all sons of bitches!"

Robert Oppenheimer, in reply: "This was the best thing anyone said after the test..."

Leo Szilard: "...using atomic bombs against Japan is one of the greatest blunders in history...a flagrant violation of our own moral standards..."

Otto Hahn: "... I was shocked and depressed beyond measure..."

In the spring of 1940, President Roosevelt said in an address to scientists: "...it is not the scientists of the world who are responsible..." [1-44].

Discoveries in pure science are not made because they are expected to be useful to mankind. They are made solely because it has become possible to make them. This is human nature, and any attempt to deny or change it would be utterly futile.

This thought was expressed again and again during the weeks and

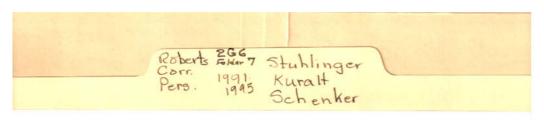
p. 20Names:

Bainbridge, Kenneth Hahn, Otto Oppenheimer, J. Robert

Roosevelt, President Szilard, Leo Scientists Under Moral Conflict

Types:

Image 27 r02g06-07-000-0058 <u>Contents</u> <u>Index</u> <u>About</u>



56

months after the bombings. Oppenheimer simply said: "If you are a scientist, you cannot stop such a thing" [1-45], and Edward Teller remarked: "If a development is possible, it is out of our powers to prevent it" [1-46].

However, where does pure science stop and applied science begin? How can the line be drawn that separates "human nature" and "our powers"? The bombs on Japanese civilians impacted the human conscience with far greater force than these philosophical arguments. President Eisenhower wrote: "...I hated to see our country be the first to use such a weapon..." [1-47], and he certainly expressed the thoughts of many of his countrymen.

For Einstein, the bombed cities in Japan must have been a rude awakening. He vocally joined those scientists who wished that America would never have dropped those bombs on Hiroshima and Nagasaki. Forgetting his repeated urgings for a speedy development of nuclear bombs during the previous five years, he said to correspondent Richard Lewis a few days after Hiroshima: "I have done no work on the subject, no work at all...", and he often repeated the statement that his "only contribution to the atomic bomb had been a letter to President Roosevelt...". To a journalist, he stated in 1952: "I have never worked in the field of applied science, let alone the military... Indeed, I have been a pacifist all my life, and I regard Gandhi as the only truly great political figure of our age" [1-48].

p. 21Names:

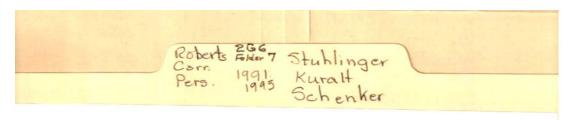
Einstein, Eisenhower, President Lewis, Richard

Types:

essay

Oppenheimer, J. Robert Roosevelt, President Teller, Edward Scientists Under Moral Conflict

Image 28 r02g06-07-000-0059 <u>Contents</u> <u>Index</u> <u>About</u>



57

Neither by his actions, nor in his statements during postwar times did Einstein offer any guiding thoughts to those scientists who find themselves confronted with the dilemma of either working for weapons, or resisting the "call of duty". His own swaying attitudes during the war years reflect the controversial convictions into which this dichotomy can lead. His only answer to the question: What should the minority of intellectuals do against this evil? was the vague recommendation: "Frankly, I can only see the revolutionary way of non-cooperation in the sense of Gandhi's. Every intellectual... must be prepared for jail and economic ruin, in short, for the sacrifice of his personal welfare in the interests of the cultural welfare of his country..." [1-49].

When Einstein gave this advice, he may have overlooked a deeply human problem. Most "intellectuals" have families; could, and should they make the decision for economic ruin also for their wives and children, particularly under circumstances when their economic ruin would be certain, but when any tangible benefits for their country, or for mankind in general, accruing from their and their families sacrifices would be extremely uncertain?

Should, or could, the advice not to indulge in any work with potential military applications be given to all those who help build airplanes, helicopters, radars, communication systems, high resolution telescopes, satellites for Earth observations, even telephones, automobiles, and railroads? What could be the criterion for an

p. 22 Names:

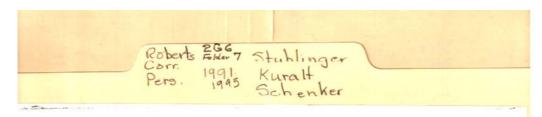
> Einstein, Gandhi,

Types:

essay

Scientists Under Moral Conflict

Image 29 r02g06-07-000-0060 Contents Index About



50

invention or a technological development that may lead -- or will never lead -- to military applications?

McCeorge Bundy, professor of history at New York University, and Special Assistant to the President for National Security Affairs from 1961 to '66, who studied the history of the atomic bomb development in impressive depth, wrote in 1968 [1-50]: "...looking back, it is well to remember that the Germans never entered the race for the bomb, that Adolf Hitler never understood the prospect, and that the best of the German physicists never really tried."

In the words of Clayton R. Koppes in his book 'JPL and the American Space Program' [1-51], "Space technology during and after World War II provided a classic example of the double-edged nature of much of scientific and engineering research. This technology offered human beings their first chance to explore the solar system, but its peaceful and intellectual purposes could easily be diverted to weaponry and propaganda."

Two gigantic weapon systems came to life during World War II, the long-range rocket in Peenemuende, and the atom bomb in Los Alamos. After hostilities had subsided, the two converged into a super-weapon, the intercontinental missile with nuclear warhead. In the shadow of its threat, a period of solid peace between the great powers unfolded which has lasted now for more than forty years. During that time, the atomic nucleus became an impressive source of energy for peaceful

p. 23 Names:

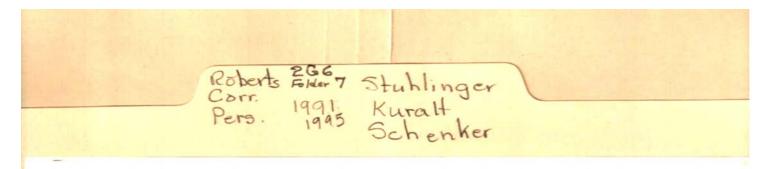
> Bundy, McGeorge Hitler, Adolph

Koppes, Clayton R.

Scientists Under Moral Conflict

Types:

Image 30 r02g06-07-000-0061 <u>Contents</u> <u>Index</u> <u>About</u>



59

purposes with a potential whose limits are even not yet in sight, and the powerful precision rocket has truly opened the doors to the universe for human exploration.

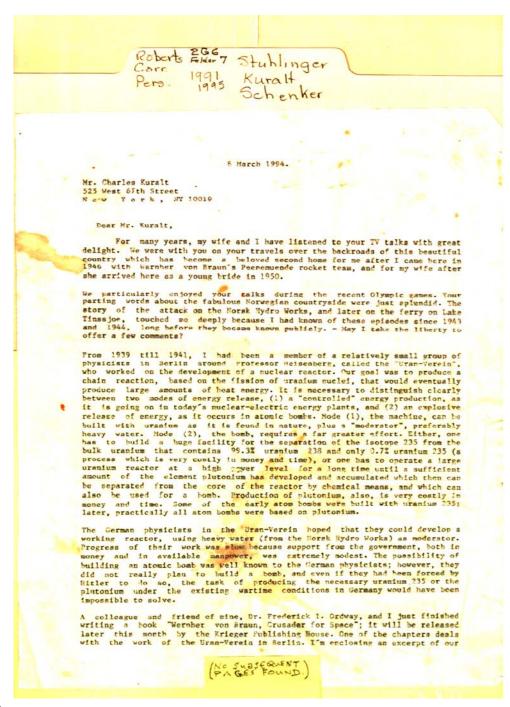
Scientists between war and peace -- who would dare to be the judge?

p. 24 Names:

> Scientists Under Moral Conflict

Types:

Image 31 r02g06-07-000-0062 <u>Contents</u> <u>Index</u> <u>About</u>



from Ernst Stuhlinger

Names:

Heisenberg, Wernher Hitler, Adolph

Places:

New York, NY

Types:

correspondence

Dates:

March 8, 1994

Kuralt, Charles

Ordway, Frederick I., Dr. von Braun, Wernher

Image 32 r02g06-07-000-0063 <u>Contents</u> <u>Index</u>

Roberts 2667 Stuhlinger Corr. 1991 Kuralt Pers. 1995 Schenker

About

DR. ERNST STUHLINGER

Huntsville, Alabama 35801

3106 Rowe Drive S.E.

Telephone: 205-534-9828

January 13, 1990

Dr. Frances C. Roberts 603 Randolph Ave. Huntsville, AL, 35801

Dear Frances,

Very unfortunately, I will not be able to attend our next Vision 2000 meeting. The reasons are explained in the attached copy of a letter to Dr. Lucas.

Dr. Lucas asked for comments on "the most important issues" of our Vision 2000 deliberations. -- Many of my thoughts on that subject concentrate on education, as reflected in my letter to Dr. Lucas. I hope that my suggestions do not deviate too far from yours!

With kindest regards

Erust

A(2100)

Names:

Lucas, William R.,

Dr.

Roberts, Frances C., Dr.

Stuhlinger, Ernst, Dr.

Places:

Huntsville, AL

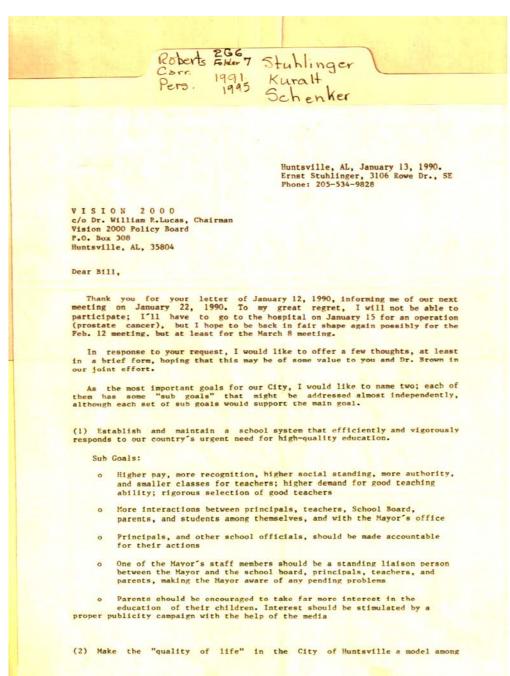
Types:

correspondence

Dates:

Jan 13, 1990

Image 33 r02g06-07-000-0064 <u>Contents</u> <u>Index</u> <u>About</u>



Names:

Brown, Dr.

Lucas, William R., Dr.

Stuhlinger, Ernst, Dr. VISION 2000

Places:

Huntsville, AL

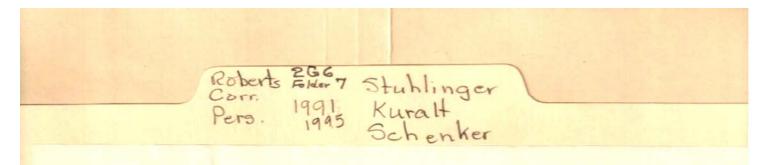
Types:

correspondence

Dates:

Jan 13, 1990

Image 34 r02g06-07-000-0065 <u>Contents</u> <u>Index</u> <u>About</u>



American cities, by providing the proper balance between

- o a healthy economy,
- o lively cultural activities,
- o a manageable traffic situation,
- o sufficient and affordable housing,
- o care for the poor,
- o and by creating and maintaining a beautiful environment inside and outside the city limits,
- o and a vigorous effort to make Huntsville the city of the lowest crime rate, the fewest drug problems, the fewest homeless, and the fewest automobile accidents.

Bill, this is a very optimistic wishing list, but it may serve a useful purpose as a basis for planning.

Sincerest wishes

Names:

Lucas, William R., Dr. (Bill)

Places:

Huntsville, AL

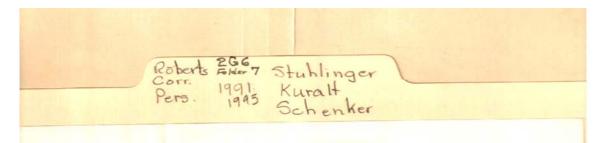
Types:

correspondence

Dates:

Jan 13, 1990

Image 35 r02g06-07-000-0066 Contents Index About



DR. ERNST STUHLINGER

Huntsville, Alabama 35801 3106 Rowe Drive S.E. Telephone: 205-534-9828

February 18, 1991.

Dr. Frances C. Roberts 603 Randolph Avenue Huntsville, AL 35801

Dear Frances,

May I offer an additional thought to our today's committee discourses?

After talking at length about setting up a Steering Committee, we still have two major actions before us:

(1) We should define very clearly what task will be assigned to the Steering Committee.

(2) We should establish at least a strawman program for the goals to be proposed by our Education Executive Committee. — Simply to name the President's 6 education goals will not suffice; as Mary Jane Caylor put it very aptly: "These goals are too lofty to serve as an action program for us." believe that our proposed program goals should be a response to the mandate Mayor Hettinger gave us: "Suggest steps the City government can take to improve education in Huntsville."

I'm sure that our Education Committee, after 2 1/2 years of discussing, thinking, reading, and listening to presentations, and with some further help from Dr. Caylor and a few other educators in Huntsville, can come up with a very useful 'first draft' of a program of suggested goals and actions. This draft program could then be improved by the Steering Committee, and further elaborated by the Summit Workshops.

Best personal regards.

Very sincerely yours

Erust

Names:

Caylor, Mary Jane

Hettinger, Steve, Mayor Roberts, Frances C., Dr.

Stuhlinger, Ernst, Dr.

Places:

Huntsville, AL

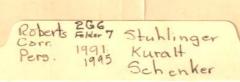
Types:

correspondence

Dates:

Feb 18, 1991

Image 36 r02g06-07-000-0067 <u>Contents</u> <u>Index</u> <u>About</u>



Huntsville Becomes a University Town

Shortly after the group of rocketeers from Texas had arrived in Huntsville, some of them were invited to an evening party where a distinguished lady, Frances C. Roberts, professor of history at the local extension of the University of Alabama in Tuscalcoas, gave a delightful lecture on Huntsville's colorful ante- and post-bellum history. After her presentation, she was asked: "What impact will that influx of modern space technology have on the City of Huntsville?" - The professor paused for a while, then said with a deep sigh: "Well, Huntsville survived that invasion of Yankees from the north; we may hope that it will also be able to survive that invasion of rocketeers from the west."

Almost forty years later, in 1988, after Huntsville's population had grown from 14 000 to about 170 000, after the little extension of the University of Alabama had burgeoned into a fully autonomous University of Alabama in Huntsville, and after Miss Roberts, now a highly honored Professor Emeritus, had become the most respected person that had ever been connected with that university, the lady was asked the same question again.

"I'm presently writing a book on the history of Huntsville", she said.
"The city has grown in steps; first during the time before the Civil War, then after the war, then during the cotton era, then after World War II. By far the most decisive step came when von Braun and his crew moved here from Texas in 1950. Just everything began to grow in leaps and bounds! The population, stores, housing projects, schools, churches, streets, the cultural life, the symphony orchestra, the wealth of the city, and, of course, our university. It was just marvelous! That will be a very important chapter in my book...".

Alahams had achieved Statehood in 1819. A few years later, the legislature of Alahams | I, 2|. It was decided that it should be built in Tuscaloosa, and that it should be fashioned after Thomas Jefferson's University of Virginia. The first teachers arrived in 1831 from Virginia and Maryland; undergreduate programs began in 1832, mester's programs in 1833. The university was destroyed by Union troops in 1865 because federal cadets were trained on university grounds, but the campus was rebuilt in 1868.

As early as 1919, the university organized an extension service to make higher education available to people at other places in Alabama. Dr. Robert E. Tidwell became Director of the Extension Division. Montgomery, Birmingham, and Mobile established "Centers of Continuing Education" under the auspices of the University of Alabama in Tuscaloosa. In 1935, Huntsville was considered as a possible location for an Extension Center, but community leaders in Huntsville were disinterested! A neighbor city, Decatur, showed a more positive attitude; a Center was opened there in 1937.

It was only during World War II that Huntsville, with increased intellectual activities, became amenable to the idea of an extension center. At that time, two young natives of Huntsville, Patrick Richardson and Macon Weaver, studied law at the University of Alabama in Tuscaloosa. In 1947, they suggested to the Chamber of Commerce that an extension center should be established in Huntsville. A committee was formed with Richardson as chairman, and with a membership that included Reese T. Amis, editor of the Huntsville Times; other prominent Huntsville citizens; and representatives of Huntsville industries, of the Army Ordnance Department at Redstone Arsenal, and of local

Topics:

by Ernst Stuhlinger

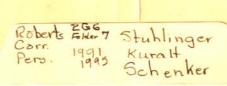
p. 1

Names:

Amis, Reese T. Jefferson, Thomas Richardson, Patrick Roberts, Frances C. Tidwell, Robert E., Dr. Weaver, Macon Huntsville Becomes a University Town von Braun, Wernher

Types:

Image 37 r02g06-07-000-0068 <u>Contents</u> <u>Index</u> <u>About</u>



veteran groups.

Richardson campaigned vigorously for the extension center, arguing that "...it is a matter vitally important to the future welfare of the boys and girls of our county...". He met with full success in 1949. The University of Alabama accepted the request for an extension center in Huntsville, and on January 6. 1950 the University of Alabama Buntsville Extension Center opened its doors for evening classes in the West Huntsville High School building.

The faculty of the fledgling center included Patrick Richardson (Lawyer; political sciences and economics); Miss Frances C. Roberts (school teacher; history); Mrs. Hamie Steger (school teacher; mathematics); and a few others. A total of 137 students enrolled, each of them paying \$ 2.- registration fee, and \$ 4.- for each credit hour.

A few months after the extension center had started operations, von Braun and his co-workers arrived from Fort Bliss in Texas. The efforts of Huntsville's citizens to offer univeristy extension services impressed him greatly. He pledged his help, and he successfully persuaded several of his associates to teach classes at the extension. Gerhard Heller taught thermodynamics, Charles Bradshaw mathematics, Hans Tschinkel chemistry, Ernst Stuhlinger theoretical physics. The Army Ordeance Department also provided part—time teachers. Von Braun anticipated and convincingly predicted a rapid development of the City of Huntsville as a result of growing industrial activities, many of them supported through federal contracts. Trained individuals would be needed; employees would ask for opportunities not only to extend their own training, but also to provide their children with academic educations. Undergraduate and graduate programs in various disciplines, technical and non-technical, should be offered right here within our city.

The urgent quest for educational opportunities increased in 1952 when the Army Missile Command was established in Huntsville. Philip Mason became Director of the Huntsville Extension Center in 1953. In spite of persisting financial difficulties, he succeeded in broadening the curriculum by adding courses in English, foreign languages, history, commerce, education, political sciences, sociology, psychology, engineering drawing, and business. However, almost all of these courses had to be taught by part-time teachers. The only full-time faculty member in 1956 was Frances Roberts, the history teacher! Two thirds of the students were employees of the government or of local industries. Courses had to be taught in the evening. A student government association did not exist. To earn a diploma, a student had to be a resident of Tuscaloosa for at least one year.

While academic life in Huntsville evolved only very slowly during the fifties, Buntsville citizens, with some help from the University in Tuscaloosa, very quietly started to lay the foundations for future growth. In 1957, the City Board reserved 8 acres of land as a first installment for a future university project. The following year, the City offered 83 acres of farmland for the same purpose; it was bought with funds contributed jointly by the City, the County, and the University in Tuscaloosa. A first building on that land, Morton Hall, was completed in January, 1961.

Huntsville experienced a tremendous growth during those years. Redstone Arsenal had become the birthplace of the Redstone and the Jupiter missiles, and of the first satellite of the Free World, Explorer I. Many new industrial enterprises, space-related industries as well as others, had come to life in

p. 2 Names:

Bradshaw, Charles Heller, Gerhard Mason, Philip Morton Hall Richardson, Patrick Roberts, Frances C., Miss Steger, Mamie, Mrs. Stuhlinger, Ernst Tschinkel, Hans Huntsville Becomes a University Town

von Braun, Wernher

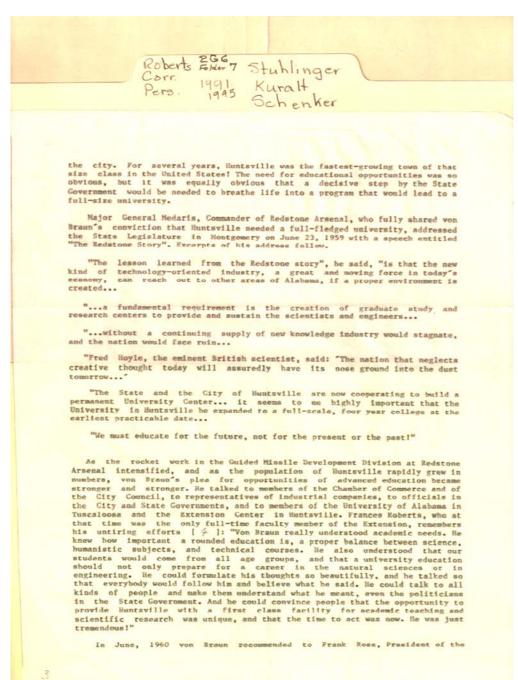
Types:

essay

Dates:

1950 1953 1961

Image 38 r02g06-07-000-0069 Contents Index About



p. 3Names:

Hoyle, Fred Medaris, Maj. Gen. Roberts, Frances Rose, Frank Huntsville Becomes a University Town von Braun, Wernher

Types:

essay

Dates:

June, 1960

Image 39 r02g06-07-000-0070 <u>Contents</u> <u>Index</u> <u>About</u>

Roberts 2007 Stuhlinger Corr. 1991 Kuralt Schenker

University of Alabama in Tuscaloosa, that educational programs in Huntsville be extended, and that a Research Institute be established in Huntsville as a focal point for the further growth of the University Extension Center. Encouraged by the positive reaction of President Rose, von Braun started a systematic effort to obtain the support of the Huntsville community, the University of Alabams Research Institute in Huntsville. This effort culminated in a speech to the State Legislature in Montgomery on June 20, 1961 [5]. Von Braun's impassioned plea for State funding support met with immediate success; he asked for 3 million dollars, and the Legislature approved his request even without a debate! "He could have asked for 5 million dollars, and he would have got it just as quickly", one of the State senators later remarked.

Von Braun's speech became a landmark in the bistory of Huntsville's university. Here are excerpts of his address:

"...During the past few years, all of us in Alabama have shared some exciting, history-making moments together. First, there were the pioneering Redstone and Jupiter missile programs; then our launching of the Free World's first satellite around the Earth, built right here in Alabama; then our launching of the Free World's first satellite around the Sun, again built right here in Alabama; then, only a few weeks ago, came our launching of the Free World's first man into space. And, I hasten to add, with the Saturn deep space rocket and other programs now underway at the Marshall Center, we expect to ring up a few more firsts before long.

"Even now, a lot of people still ask me: "Why do you want to go to the Moon?" I like to remind them of one of this country's most famous scientists.

"When wise old Ben Franklin sent up his kite that day in the thunderstorm, he got his knuckles singed by electricity. What did Franklin learn by this experiment? Not Much. Only that electricity from the clouds would shock him. But because Ben was curious about the world around him, his simple research — plus a few more experiments conducted elsewhere — stirred up a lot of interest. A burst of attention was then focussed on electrical research, and, as a result, old Ben Franklin's kite sparks flew around the world. Today, we would not be able to drive a tractor, fly an airplane, light a house, or send a satellite into space without electricity.

"My point here is that as wise as Ben Franklin was, he didn't have the faintest idea of the great benefits that were in store for mankind as a result or the first faitering experiments that he and others about that time carried out. But Franklin did have scientific curiosity. It was curiosity that made him go fly a kite that day, not some mysterious, prophetic knowledge that he was about to help pave the way for wast new benefits for all mankind.

"It is curiosity that sets man apart. It is curiosity that makes him learn. This has been true throughout history -- first curiosity, then learning, then advancement.

"But the guy who is curious, the restless searcher for new knowledge, never knows where his curiosity will lead him. All he knows is that some time, in some way, the knowledge he digs up will better the lot of his fellow man.

"For instance, the great bacteriologist, Sir Alexander Fleming, found one

Topics:

p. 4

speech to state legislature

Names:

Fleming, Alexander,

Sir

Types: essay

Dates:

1961

Franklin, Benjamin Rose, Frank Huntsville Becomes a University Town von Braun, Wernher

Image 40 r02g06-07-000-0071 <u>Contents</u> <u>Index</u> <u>About</u>

Roberts 2667 Stuhlinger Corr. 1991 Kuralt Pers. 1995 Schenker

day that certain bacteria were killed by a mold. This accidental discovery - which happened because Fleming was curious about mold -- gave us penicillin.

"He didn't have the faintest idea that what he saw under his microscope that day would end up by saving many, many thousands of human lives. It's always that way. We just never know what the next bit of information will bring forth.

"That's why we want to -- and why we must -- explore space. It's our next frontier, our newest challenge, and the greatest unknown today.

"I am convinced that the exploration of outer space will produce undreamed of benefits for all of us. And the very fact that nobody knows for sure what all of these benefits will be opens new prospects and excites our imagination to further progress...

"The other day The President said that we should go to the Moon. Well, he is not alone. Let us just hope that somebody named Ivan Ivanovitch or Yuri Gagarin doesn't get there first.

"How are we going to get there? And when?

"First, let me say here and now that this country has nothing to be ashamed of in comparison with the Soviets in space exploration to date... We have orbited many more scientific satellites than they; and from them we have gleaned a great deal more new scientific information about the universe than anyone else.

"The area where we are obviously behind is in the field of big boosters, the big push. That is the bottleneck. That's why I should like to talk with you today about our efforts in big space booster development...

"We are all highly gratified, of course, by Alan Shepards successful and historic voyage aboard the Mercury-Redstone rocket. But to achieve this we had to fall back on that old reliable Alabama-made Redstone rocket.

"The Redstone was first developed as a weapon. It has never yet been fired in anger. But when we got into trouble (and maybe angry) because the Russians beat us up there with their Sputniks, we had to call on the Redstone to put the first American earth satellite into orbit... Then, after Yuri Cagarin's orbit — in an effort to stay in the man-in-space race — we again relied on that old reliable Redstone to boost our first American into space."

You Braun then described the Saturn project which had been underway since the late fifties, and which will take American Astronauts to the Moon.

"We expect the Saturn deep space rocket to be the major rocket for U.S. space exploration for a number of years", he continued. "It is the first large rocket to be developed in the U.S. exclusively for scientific peaceful research.

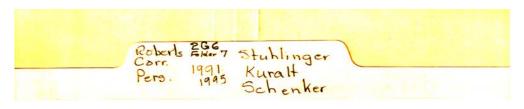
"When the Saturn puts men into space it will carry a spacecraft known as Apollo. The Apollo is not only an extension of the Mercury man-in-space program, it has other capabilities. For instance, men can use it to observe the surface and cuvironment of the Moon before a manned landing takes place. The Apollo is also sufficiently flexible to serve as a manned orbiting

p. 5Names:

Fleming, Alexander, Sir Gagarin, Yuri Ivanovitch, Ivan Shapard, Alan Huntsville Becomes a University Town von Braun,

Types:

Image 41 r02g06-07-000-0072 <u>Contents</u> <u>Index</u> <u>About</u>



laborastory, a laboratory where man can perform useful space research in a low earth orbit. This orbiting laboratory is a necessary step leading toward a permanent manned space station."

A substantial part of von Braun's presentation dealt with technical details of the Saturn-Apollo Project. But then he returned to the central subject of his address.

"What will it take", he asked, "for this country to regain lost prestige, and once more assume its place as the scientific and technological leader among nations? More particularly, what can the people of Alabama do?

"The Marshall Center in Huntsville is now in the process of hiring more than 1600 new employees. Most of the people we need so urgently are graduate engineers and scientists. In other words, highly skilled and educated men and women.

"Although a substantial number of our present technical people are products of Alabama's educational system, most of them, frankly, have come from elsewhere — from all 50 States and several other countries, as a matter of fact.

"You have heard and seen what kind of people we need, and what we need them for. We need the best, and we need them for one of the most vital jobs in the history of free men.

"This, I submit, is substantial evidence to show that opportunity is knocking at Alabama's door, and knocking hard, just as opportunity knocked on California's door a few decades ago when the aircraft industry was beginning to blossom.

"The question today is: Will Alabama open the door? As a proud citizen of this State and this country, I feel a responsibility to raise this question with you, and to discuss it openly and frankly.

"Shakespeare said: There is a tide in the affairs of men, which, taken at the flood, leads on to fortune". For Alabama, the tide is at flood now — but it is passing fast. My appeal to you is to recognize this and to take action today while the opportunity is still available. I am sure there are very few problems in Alabama which could not be solved with more money. The proper capital investment at this time can produce that money for the State of Alabama.

"Now, what investment am I speaking off? I am speaking of an investment in people -- strong, capable, educated people! Opportunity goes where the best people go, and the best people go where good education goes.

"Unless we get, and keep, many more bright young men and women very soon to help us carry the present load, our programs -- and Alabama -- will suffer...

"To make Huntsville more attractive to technical and scientific people across the country, and to further develop the people we have now, the academic and research environment of Huntsville and Alabama must be improved, and improved immediately. As many of you know, the University of Alabama has a University Extension Center in Huntsville, which is definitely a step in the

p. 6 Names:

Marshall Center

University Extension Center Huntsville Becomes a University Town von Braun,

Places:

Huntsville, AL

Types:

Image 42 r02g06-07-000-0073 <u>Contents</u> <u>Index</u> <u>About</u>

Roberts 2667 Stublinger Corr. 1991 Kuralt Pers. 1995 Schenker

right direction. In addition, a small Research Institute was just opened in close affiliation with that Center. As this institute grows, large corporations will be encouraged to establish research organizations nearby to form an industrial research park as a part of the University complex, which in turn will give birth to major new industries throughout the State.

"The citizens of Alabama should recognize even more fully that the United States, as well as other leading countries in the world, now lives in a technological age. The efforts along this line that have been taken in the past — in developing our technological manpower and other industrial resources — will not, I repeat, will not suffice to keep pace with the other States and nations today. It is the university climate that brings the business.

"What do you think attracted the aircraft industry to the Los Angeles area? The desert and smog? No, it was U.C.L.A. and CalTech and the Art Institute and St. Mary's and The University of Southern California.

"Was it beans that brought great electronic and other industries to Boston? It was the Educational Triangle of Boston University, Harvard, and M.I.T.

"Let's be honest with ourselves about it: It's not water, or real estate, or labor, or power, or cheap taxes that brings industry to a State or city. It's brainpower. Nowadays, brainpower dumped in a desert will make it rich. You could run a profitable electronics firm on the Moon if the company liked the climate— educational climate, that is. Without question, such a climate is the most important single resource in attracting new people and new ideas. It is a self-generating process. Once you get it started, it snowballs...

"The State of Alabama -- in this case, you -- has a very real responsibility to promote the advancement of science and higher education. In short, it is up to you to create the right climate.

"In Huntaville, we are trying to create a vigorous and varied educational and research climate. The seed is sown with the University Extension Center and the infant Research Institute. But the seed is starving. It needs something green: Money.

"To be specific, the Research Institute needs, at this very moment, three million dollars for buildings and equipment. Following this first investment the Institute will not only be self-sustaining, but it will enrich the State both financially and culturally...

"For a three million dollar investment now, I promise that you will reap billions. Easily billions...

"On one hand, you have the greatest opportunity for wealth, prosperity, and culture ever offered to this State, and seldom to any other State. On the other hand, you face the greatest of dangers — the danger of economic competition from other cities, States, and nations all over the world...

"I do not believe that you will back away from this competition. I believe I know the citizens of my State well enough to say with full confidence that they will accept this challenge with the gusto of Macbeth when he said: 'Lay on, Macduff, and damn'd be him that first cries, 'Hold, enought'....

p. 7 Names:

Research Institute

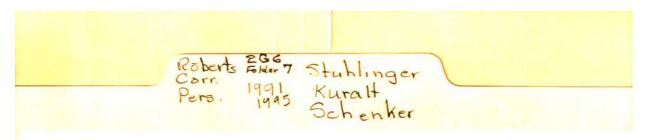
Huntsville Becomes a University Town

Places:

Huntsville, AL

Types:

r02g06-07-000-0074 Contents Index Image 43 About



Alabama's legislators did 'lay on'. The City of Huntsville and Madison County added 400 000.- dollars to their State's 3 million, a fine Research Institute was built, and Dr. Rudolf Hermann -- who had built the large supersonic wind tunnel in Peenemuende during the thirties -- became its first director.

Around the same time in 1961, the Brown Engineering Company in Buntsville (later to become Teledyne Brown Engineering) purchased 150 acres of land and began to construct facilities for further development. Portions of the land were sold at cost to stimulate other industries to settle there. The president of Brown Engineering, Milton K. Cummings, and his associate, Joseph C. Moquin, worked with the City Council to establish a Research Park that would provide a district for development of mutually harmonic industries, research facilities, and educational institutions [3]. This project met with outstanding success. In 1974, the City Council named the Research Park for the late Milton K. Cummings in honor of his contributions to the community.

The Huntsville Center of the University of Alabama, to which the Research Institute was attached, began to plead for an autonomous university status in 1963. H. Clyde Reeves became Vice President for Huntsville Affairs of the University of Alabama, and the following year the Huntsville Center was given the designation University of Alabama, Huntsville Campus. It was still financially dependent on the Tuscaloosa campus, but in 1965 the State Legislatures introduced for the first time a line item allocation in its budget 'to the Huntsville Campus'. Again one year later, the Huntsville Campus became the University of Alabama in Huntsville. The full rank of an autonomous university was bestowed on the Huntsville Campus in the summer of 1969, after President Rose and Vice President Reeves had retired. At that time, the University of Alabama trustees reorganized the system, creating three autonomous universities: Tuscaloosa, Birmingham, and Huntsville. Dr. Benjamin B. Graves became President of the UAH on December 15, 1969. He held that position until 1979 when he was succeeded by President John C. Wright. In 1988, John Padulo became the successor of Dr. Wright as President of the 1988, John UAH.

As one of the youngest universities in the nation, the University of Alabama in Huntsville had an enrollment of students in 1988.

p. 8 Names:

Brown Engineering

Hermann, Rudolph,

Cummings, Milton K. Graves, Benjamin B.,

Moquin, Joseph C. Padulo, John Reeves, H. Clyde

Research Park Rose, Frank Teledyne Brown Engineering

Wright, John C.

Huntsville Becomes a University Town

Types:

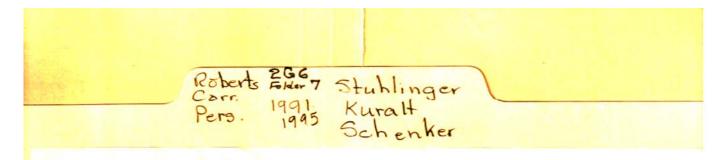
essay

Dr.

Dates:

1988 1961 1969 1979

Image 44 r02g06-07-000-0075 <u>Contents</u> <u>Index</u> <u>About</u>



Huntsville Becomes a University Town

- "A History of the University of Alabama in Huntsville" by James E. Ferguson, III. 1975.
 The University of Alabama in Huntsville, 35899
- 2). "The University of Alabama Self-Study" Departmental Report of the Huntsville Center, Feb. 15, 1963 The University of Alabama in Huntsville, 35899
- "The Milton K. Cummings Research Park"
 Publication by the Research Park Advisory Committee
 Printed by Teledyne Brown Engineering, Huntsville, AL, 1982
- 4). Private communication by Dr. Roberts to Ernst Stuhlinger, 1988.
- 5). Address by Dr. Wernher von Braun, George C. Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, AL before a Joint Session of the Alabama Legislature, Montgomery, Alabama June 20, 1961. Legislative Document # 1. Printed by House.

p. 9 Names:

Bibliography

Huntsville Becomes a University Town

Types:

Contents Index About

Table of Contents

<u>Image 1</u> (r02g06-07-000-0032)	Image 13 (r02g06-07-000-0044)	Image 25 (r02g06-07-000-0056)	Image 37 (r02g06-07-000-0068)
Image 2 (r02g06-07-000-0033)	Image 14 (r02g06-07-000-0045)	Image 26 (r02g06-07-000-0057)	Image 38 (r02g06-07-000-0069)
Image 3 (r02g06-07-000-0034)	Image 15 (r02g06-07-000-0046)	Image 27 (r02g06-07-000-0058)	Image 39 (r02g06-07-000-0070)
<u>Image 4</u> (r02g06-07-000-0035)	Image 16 (r02g06-07-000-0047)	Image 28 (r02g06-07-000-0059)	Image 40 (r02g06-07-000-0071)
<u>Image 5</u> (r02g06-07-000-0036)	Image 17 (r02g06-07-000-0048)	Image 29 (r02g06-07-000-0060)	Image 41 (r02g06-07-000-0072)
<u>Image 6</u> (r02g06-07-000-0037)	Image 18 (r02g06-07-000-0049)	Image 30 (r02g06-07-000-0061)	Image 42 (r02g06-07-000-0073)
<u>Image 7</u> (r02g06-07-000-0038)	Image 19 (r02g06-07-000-0050)	Image 31 (r02g06-07-000-0062)	Image 43 (r02g06-07-000-0074)
Image 8 (r02g06-07-000-0039)	Image 20 (r02g06-07-000-0051)	Image 32 (r02g06-07-000-0063)	Image 44 (r02g06-07-000-0075)
Image 9 (r02g06-07-000-0040)	Image 21 (r02g06-07-000-0052)	Image 33 (r02g06-07-000-0064)	Table of Contents
Image 10 (r02g06-07-000-0041)	Image 22 (r02g06-07-000-0053)	Image 34 (r02g06-07-000-0065)	Name & Place Index
Image 11 (r02g06-07-000-0042)	Image 23 (r02g06-07-000-0054)	Image 35 (r02g06-07-000-0066)	About the Collection
Image 12 (r02g06-07-000-0043)	Image 24 (r02g06-07-000-0055)	Image 36 (r02g06-07-000-0067)	

Contents Index About

Name & Place Index

Amis, Reese T. <u>36</u>	Huntsville Becomes a University Town 36, 37, 38, 39,
atomic bomb <u>10</u>	<u>40, 41, 42, 43, 44</u>
Aydelotte, Frank 24	Huntsville, AL <u>1</u> , <u>2</u> , <u>3</u> , <u>4</u> , <u>5</u> , <u>6</u> , <u>32</u> , <u>33</u> , <u>34</u> , <u>35</u> , <u>41</u> , <u>42</u>
Bagge, Erich Rudolph 12	Huzel, Dieter <u>1</u>
Bainbridge, Kenneth <u>26</u>	Ivanovitch, Ivan 40
Bergaust, Erik 7	Jefferson, Thomas 36
Bethe, Hans 12	Jensen, Hans 12
Bibliography 44	Koppes, Clayton R. <u>29</u>
Bohr, Niels <u>12</u> , <u>24</u> , <u>25</u>	Kuralt, Charles 31
Bothe, Walther 12	Lewis, Richard 27
Bradshaw, Charles <u>37</u>	Lucas, William R., Dr. (Bill) 34
Breit, Gregory 12	Lucas, William R., Dr. <u>32</u> , <u>33</u>
Brown Engineering Co. <u>43</u>	Marshall Center 41
Brown, Dr. <u>33</u>	Mason, Philip 37
Bucky, Gustav, Dr. 25	Medaris, Maj. Gen. 38
Bundy, McGeorge 29	Meitner, Lise 12
Bush, Vannevar <u>24</u> , <u>25</u>	Moquin, Joseph C. 43
by Ernst Stuhlinger 7, 36	Morton Hall 37
Caylor, Mary Jane 35	New York, NY 31
Christenson, Dave 1	Oppenheimer, J. Robert <u>12</u> , <u>20</u> , <u>25</u> , <u>26</u> , <u>27</u>
Churchill, Winston 6	Ordway, Frederick I., Dr. 31
Clark, Ronald W. 23	p. 1 <u>7, 36</u>
Clusius, Klaus 12	p. 4 <u>39</u>
Cummings, Milton K. 43	Padulo, John <u>43</u>
Diebner, Kurt 12	Pauling, Linus 23
Doepel, Gustav Robert 12	Peenemuende & Los Alamos 9
Dooling, Dave 1	Pegram, George B. <u>12</u> , <u>13</u>
Einstein, 14, 15, 21, 23, 24, 25, 27, 28	Rees, Eberhard 1
Eisenhower, President 27	Reeves, H. Clyde <u>43</u>
Fermi, Enrico 12, 13, 15, 20	Reisig, Gerhard, Dr. 1
Fleming, Alexander, Sir 39, 40	Research Institute 42
Fluegge, Siegfried 12	Research Park 43
Franklin, Benjamin 39	Rhodes, Richard 23
Frisch, Otto R. 12	Richardson, Patrick 36, 37
Gagarin, Yuri 40	Roberts, Frances C., Dr. <u>32</u> , <u>35</u>
Gandhi, 28	Roberts, Frances C., Miss 37
Geiger, Hans <u>12</u> , <u>16</u>	Roberts, Frances C. 36
Gerlach, Walter 12	Roberts, Frances, Dr. 1, 3
Graves, Benjamin B., Dr. 43	Roberts, Frances 38
Hahn, Otto 11, 12, 13, 21, 22, 26	Roosevelt, President <u>14</u> , <u>15</u> , <u>21</u> , <u>23</u> , <u>24</u> , <u>26</u> , <u>27</u>
Harteck, Paul 12	Rose, Frank 38, 39, 43
Haxel, Otto 12	Sachs, Alexander <u>14</u> , <u>24</u>
Heisenberg, Elisabeth 18	Schenker, David, Dr. 5
Heisenberg, Wernher 4, 11, 12, 13, 15, 16, 17, 18, 19,	Scientists Under Moral Conflict <u>7</u> , <u>8</u> , <u>9</u> , <u>10</u> , <u>11</u> , <u>12</u> , <u>13</u> .
21, 23, 24, 25, 31	14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28,
Heller, Gerhard <u>37</u>	29, 30
Hermann, Rudolph, Dr. 43	Segre, Emilio 12
Hettinger, Steve, Mayor 35	Shapard, Alan 40
Hitler, Adolph 29, 31	Smyth Report 10
Hitler, <u>18</u>	speech to state legislature <u>39</u>
Hitler 8	Speer, Albert $\frac{4}{5}$, $\frac{17}{5}$
Hoyle, Fred 38	Steger, Mamie, Mrs. <u>37</u>
110y1c, 11cu <u>50</u>	Siegel, Iviainie, Iviis. <u>31</u>

Strassman, Fritz 11	University Extension Ce
Stuhlinger, Christoph <u>1</u>	Urey, Harold C. 12
Stuhlinger, Ernst, Dr. <u>3</u> , <u>32</u> , <u>33</u> , <u>35</u>	VISION 2000 <u>33</u>
Stuhlinger, Ernst 2, 5, 11, 16, 37	Volz, Helmut 12
Stuhlinger, Irmgard 1	von Braun, Wernher 31,
Stuhlinger, Tilman 1	von Braun, <u>1</u> , <u>2</u> , <u>3</u> , <u>4</u> , <u>7</u> ,
Szilard, Leo <u>12</u> , <u>13</u> , <u>14</u> , <u>15</u> , <u>20</u> , <u>21</u> , <u>26</u>	von Laue, Max 12
Tarter, Donald E. 9	von Weizsaecker, Karl F
Teledyne Brown Engineering <u>43</u>	Weaver, Macon 36
Teller, Edward <u>12</u> , <u>14</u> , <u>27</u>	Weisskopf, Victor 12
Tidwell, Robert E., Dr. 36	Wigner, Eugene P. <u>10</u> , <u>12</u>
Tschinkel, Hans <u>37</u>	Wirtz, Karl 12
Ulam, Stanley <u>12</u>	Wright, John C. 43
· •	<u> </u>

University Extension Center <u>41</u>		
Urey, Harold C. <u>12</u>		
VISION 2000 <u>33</u>		
Volz, Helmut <u>12</u>		
von Braun, Wernher <u>31</u> , <u>36</u> , <u>37</u> , <u>38</u> , <u>39</u>		
von Braun, <u>1</u> , <u>2</u> , <u>3</u> , <u>4</u> , <u>7</u> , <u>8</u> , <u>9</u> , <u>10</u> , <u>11</u> , <u>19</u> , <u>40</u> , <u>41</u>		
von Laue, Max 12		
von Weizsaecker, Karl Friedrich 12, 21, 22		
Weaver, Macon 36		
Weisskopf, Victor <u>12</u>		
Wigner, Eugene P. <u>10</u> , <u>12</u> , <u>13</u> , <u>14</u>		
Wirtz, Karl 12		
Wright, John C. 43		

Frances Cabaniss Roberts Collection

Preferred Citation: Frances Cabaniss Roberts Collection, Archives and Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, AL.

Collection Scope and Content: The Collection of 114 Linear ft. includes a total of 156 Archival Boxes. The Frances Cabaniss Roberts collection covers the historical records of the Cabaniss Roberts family. This collection contains extensive correspondence records of the Cabaniss Roberts family circa 1830 to 1930.

Archives/Special Collections Access Restrictions: None

Conditions Governing Use: This material may be protected under U. S. Copyright Law (Title 17, U.S. Code) which governs the making of photocopies or reproductions of copyrighted materials. You may use the digitized material for private study, scholarship, or research. Though the University of Alabama in Huntsville Archives and Special Collections has physical ownership of the material in its collections, in some cases we may not own the copyright to the material. It is the patron's obligation to determine and satisfy copyright restrictions when publishing or otherwise distributing materials found in our collections.

Provenance: Gift of Johanna Shields on October 28, 2006.



The UAH Archives and Special Collections M. Louis Salmon Library