

further excerpts from a RUSSIAN DIARY

By Luis W. Alvarez

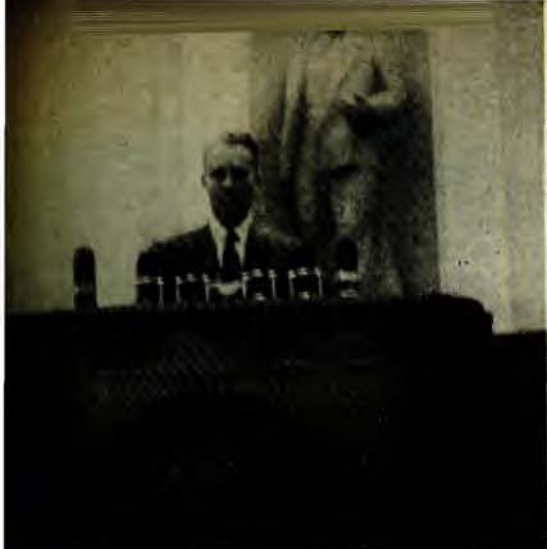
The following is the second part of a personal diary kept by Luis W. Alvarez of the University of California while visiting Russia last year as one of fourteen physicists from the United States who were invited to attend the Moscow Conference on High-Energy Physics, held in May 1956 by the Academy of Sciences of the USSR. Part I of his journal, covering the period May 11-19, 1956, appeared in last month's issue of Physics Today. Part II, presented below, is a continuation of the diary from Sunday, May 20, through the following Sunday, May 27, 1956, by which time the conference had ended and Alvarez had commenced his return journey home.

SUNDAY. We had a most amazing tour of the Kremlin today. None of our interpreters had ever been inside the Kremlin walls before, although it is possible to get tickets which allow Russians to go inside. But such tickets do not permit anyone into the buildings and rooms we visited. The normal visitor can only walk in certain places, and look inside the churches. We started our tour by entering the northeast gate under the famous clock tower, the Big Ben of Russia. We watched the changing of the guard at the Lenin-Stalin mausoleum at 10 AM and followed the men as they goose-stepped their way to the northeast gate of the Kremlin. We were taken to the large building where Lenin lived and worked. We passed down a long corridor, which reminded me of the corridor outside the Chiefs of Staff offices in the Pentagon Building. I translated one of the names on the impressive big doors as Mikoyan. We were surprised to find one of the offices open and noticed maps of Russia hanging on the wall. We soon found out, when we were taken inside, that this had been Lenin's private office where he did all his work. The office was arranged exactly as it was when he left. (He was sick for several months in 1923 and died in the spring of 1924.) This room is one of the sacred shrines of Communism and our interpreters were absolutely bug-eyed to find themselves there. Lenin worked at a small desk, sitting in a straight chair. The desk butted up against a felt covered table surrounded by large stuffed leather easy chairs. The table and chairs were for the visitors and government officials who came to talk with him. The room was roughly square and about twenty or twenty-five feet on a side. The wall behind Lenin's chair was covered with bookshelves which were filled with books in Russian, French, German, and English. Lenin read all these languages and was apparently a rather scholarly man. His private apartment, just down the hall, also was filled with

books—the guide said there were 20 000 books in Lenin's private study and 2000 in his office. We walked around the room and examined the various objects on the tables. I had the feeling that Lenin might show up at any minute—the room was in such a natural state. There was a large oil painting of Karl Marx on the wall, facing Lenin as he sat at his desk. The maps had been marked by Lenin, and the calendars on the desk and on the wall were opened to a day in 1923.

The door next to Karl Marx's picture opened into a large conference room where the Russian Council of Ministers still meets. The long table in this room was covered with green felt and there were pads of paper and pencils in front of each chair. The man who presides at the meetings these days is Bulganin. The chair Lenin used when he presided is against the wall, covered with a glass case. This is to remind the present Ministers that Lenin is there in spirit. All around the wall are pictures of Communist heroes.

Beyond this room, and on the same corridor, are the private quarters where Lenin and his family lived. We went into his library and his kitchen, where he often prepared his meals when he came back late from his office. The Lenin family ate in the small kitchen, at a table covered with oilcloth. The guide opened the cabinets where their dishes and table utensils were kept. It wasn't like going through Mt. Vernon, where there are velvet ropes to keep the crowds from touching things. We wandered all around in what appeared to be the home of a family which was away for the weekend. Then we went into Mrs. Lenin's room, where she lived after Lenin's death until she died in 1939. There were family photographs of Lenin and relatives on her dresser and a box of darning materials in her desk. There were earphones for her radio set on the desk.



The hall of the Supreme Soviet. "We asked the guides if it would be OK to have our pictures taken standing at the speaker's lectern."

ones in a newer section of the building. The newer sections looked very much like parts of Versailles where the French kings lived.

We went from the czars' rooms to the only newly constructed area inside the Kremlin—the hall of the Supreme Soviet. Everyone has seen pictures of the front of the room, with the statue of Lenin and the desks of the Ministers facing the desks of the delegates. The surprising thing to me was the length of the room—between 200 and 300 feet. We asked the guides if it would be OK to have our pictures taken standing at the speaker's lectern. They said it was all right, so a number of us posed for pictures in this unlikely spot. (My party was not allowed to take pictures in Lenin's apartment, but others were.)

From the palace we went on a tour of a museum, which looked like any European museum as far as I was concerned. It was loaded with cabinets of clothes, guns, armor, etc. From there, we walked diagonally across the Kremlin grounds for our visit to the mausoleum. It was raining fairly hard by this time, and we waited for the guard to change, before going to the tomb. It was a shame that the weather was so bad during our tour of the Kremlin—the pictures we took won't be nearly so colorful as they might have been. Fortunately, it didn't start to rain until after we had taken most of our pictures. We were at the guard post inside the walls, when the relief pair of soldiers went out at three minutes before 2 P.M. One soldier stands at each side of the entrance to the tomb for two hours, absolutely motionless. When the men they relieved came back to where we were, we formed into a column, two abreast, and walked out the gate along the north wall to the tomb. As we approached the line of Russian citizens they were stopped and we cut in ahead of them. These people had been standing in line for several hours—the queue on Sundays may contain 15 or 20 thousand people, and it moves at a snail's pace. I can imagine what a bunch of Americans would have to say, if after standing in line for five hours, a group of visiting Russians was allowed to cut in ahead of them. We walked through the door, past the soldiers, and turned to the left. We went down a long flight of stairs along the left-hand side of the mausoleum and turned right, into the large crypt. There were about twenty Russian soldiers standing stiffly at attention, all around the coffins. Lenin and Stalin are lying inside glass-walled cases, with only their heads and hands showing. They are exceedingly lifelike. After filing very slowly past the coffins, we emerged at the western side of the tomb and walked back to the hotel for lunch.



"... the queue on Sundays may contain 15 or 20 thousand people, and it moves at a snail's pace."

The next three rooms were Lenin's private quarters, where he slept and lived with his family. In the parlor was a piano, on which his sister played for him. The tables were covered with gifts from his admirers. I remarked to my interpreter that although she hadn't been here before, she was probably familiar with these rooms from photographs. She said she had never even seen photographs of the apartment, although she had seen many of Lenin's office. I would guess that no more than a handful of Americans have ever been in the apartment before. (I confirmed this later by talking with newsmen and Embassy people.)

After more than an hour in the Lenin quarters, we walked back to the part of the Kremlin where the regular visitors were looking at the large cannon and the great bell in front of one of the many churches. I took a lot of pictures while we walked around and looked inside the churches. They are all lavishly decorated with gold. The walls are all covered with pictures, and much of the floor space is covered with tombs. All the sarcophagi are made of metal, and stand about four feet high from the floor. The churches are of all ages, going back to the 15th century. We went into a room where we saw the tombs of Ivan the Terrible and his eldest son, whom he killed with his own hand in a fit of rage. The regular visitors weren't allowed there.

From the area of the churches, we went into the large building which now houses the Supreme Soviet—the Russian parliament. This building (formerly called the Palace of the Czars, but now called the Palace of the Soviets) is the Versailles of the Kremlin. It has a huge ballroom (the Georgian Hall) with a beautifully inlaid hardwood floor, which is now used for official receptions and for the presentation of military decorations. The oldest section of the building is the residence of the old czars. We went through their rooms, which were on the third floor. We saw the czars' private bedroom and private chapel, and the family chapel, which was richly decorated in gold and beaten silver. Not knowing anything about Russian history, I can't tell what czars used these old quarters and which ones used the more modern

After lunch, I took a nap, starting at 4:30. I was sure I would wake up in plenty of time to attend the ballet at the Bolshoi Theater at 7:30, but I didn't wake up until 8 PM. So I have a couple of hours to catch up on my diary.

We now have Russian money. Our interpreters gave each of us 200 rubles yesterday. Peierls and Skinner from England were interviewed on the Russian radio yesterday, and were each paid 400 rubles. Rubles aren't of any value outside Russia (they aren't traded in the money markets), so the British are thinking of buying a bucket of caviar and taking it home. I forgot to say that yesterday, at Veksler's Institute, some CBS photographers took movies of us talking with the Russian scientists. That was the first time we have seen any newsmen around the conference.

Oliphant had dinner at Kapitza's home—they are old friends from Cambridge. Kapitza was in the dog house with Beria for eight years, as we had heard. He was confined to his summer home, about 40 miles from Moscow, for that whole period, and someone else took over his Institute. He was paid well during that time—he gets 30 000 rubles per month! But he was under what amounts to house arrest. Now he is back at his own Institute, and in good repute again.



"... fifteen or twenty graduate students and young PhD's cornered me and asked lots of questions. ..."

MONDAY. This morning, I gave the first paper of the scientific session. They gave me a nice hand as I walked up to the platform. I spoke about experiments our group has done at the Bevatron, and told about our development of liquid hydrogen bubble chambers, and showed slides of the work we have done with them. There were a good many questions after the talk. At the intermission for cakes and the ever-present soda pop, I talked with Pontecorvo about an experiment he and I had independently proposed a number of years ago. The experiment has finally been done in the US in the last few months, but not published yet. Pontecorvo was very interested in the results, but was obviously in a hurry to get away, before we ran out of physics talk. But he came back in a few minutes to ask another question about the experiment, and then disappeared again. After that, a group of about fifteen or twenty graduate students and young "candidates in physics" (equivalent to our PhDs) cor-

nered me and asked lots of questions about our work and about the educational system in America. We didn't have a good interpreter, but we managed to understand each other—sometimes with difficulty. When I had finished explaining our system in detail, from the first grade on, and was ready to get the same story from them, my interpreter said I had to go to another institute. This one is directed by Academician Lebedev (obviously not the man for whom the Lebedev Institute is named) and is devoted to the development of high-speed electronic computers—like the Univac. They are particularly concerned with automatic translation of other languages into Russian. They showed us some examples of English translated by their machine into Russian. They gave me a few pieces of Russian electronic equipment, and some Russian-made magnetic tape. I thought my friends at Ampex would be interested in the sample of magnetic tape.

After lunch—where I met Art Kip, who had just arrived—I went on a tour through GUM, the largest department store in Moscow. Lyle Smith and I walked down each aisle on both floors; it took us about two hours. We found very little which we were tempted to buy. Everything that appealed to us was far too expensive, and all the reasonably priced things were unattractive to us as souvenirs of Moscow. The store didn't seem to have any logical scheme of arrangement of the various departments. We found three thread departments, and they might be next to a camera department, or a men's suit department. Every clerk has an abacus, and she knows how to use it efficiently as an adding machine. One sees an abacus at all business counters—they must teach its use in the elementary schools. The most expensive thing we saw was a fur coat at 30 000 rubles.

I came back to the hotel just in time to wash up before going to a party at Prof. Kapitza's Institute. Several long tables were set up in his large office, and we had a nice supper with lots of wine, caviar, sandwiches, cheese, and fruit. Before the supper, we got into a typical physicists' session of puzzles and jokes, so we were relaxed. This party was the most natural one of the conference—both Russians and visitors have gotten quite used to being with each other, so it no longer is the case that everyone is consciously trying to be on his best behavior. We just acted naturally and had a wonderful time. There was lots of laughter and some hot arguments about physics be-



"... a party at Prof. Kapitza's Institute."



Gell-Mann and Landau. "... laughter and some hot arguments about physics between the theoreticians. ..."

tween the theoreticians—just what goes on at any gathering of American physicists. There was no need for a lot of toasts. Everyone knew that we were happy to be here, and that the Russians were happy to have us as their guests. Landau is the chief theoretical physicist at Kapitza's Institute, and our theorists say we have no one better than he is. He has a large number of top flight men working with him. I had a good talk with Kapitza's son, who works in the field of solid-state physics. He translated my talk this morning, but I wasn't introduced to him at that time. He speaks perfect English—he came to Russia from Cambridge when he was seven.

I had a talk with my new interpreter, who is taking Nick's place. He was a medical officer at the front lines during the war, and spent some time in Berlin after the war. He got to know the Americans there, and picked up a lot of colloquial expressions. He comes from an interesting and well-educated family: his father is a gastroenterologist, his mother is a neurologist, and his wife is an aeronautical engineer. He is now on the staff of the Moscow Institute of Economics, and has given up his medicine. He is much in demand as an interpreter and seems to enjoy it, but his real love these days is economics.

TUESDAY. This morning I didn't go to the meeting, but slept late. Murray Gell-Mann and I went to the American Embassy at noon—we were invited to Ambassador Bohlen's for lunch at 2:15. We thought we might find some recent newspapers in the Embassy library, but all they had were old ones. We called on Mr. Guthrie, the first secretary, whose name I had been given in the States. We talked with him for a while, and then he took us downstairs to his apartment, where his wife and several other ladies of the Embassy group were just finishing a "PTA meeting". They were deciding what to do with the children during the summer vacation. We talked with a couple of them until it was time to go to lunch. I saw the edition of the *Paris Herald Tribune* with the story of Pontecorvo's question at the Segrè session. It was on the first page with a big picture of Pontecorvo. I told Mr. Guthrie how I had been mousetrapped, and he said the Moscow newsmen were a little too eager. He later told the Ambassador in my presence, and the Ambassador sympathized with me and said no harm was done. We drove from the Embassy to the Bohlen's palatial home. It was formerly the residence of a prerevolutionary food

merchant. (Most of the Embassy's forty families live in the ten-story Embassy building, where they have very pleasant, American-looking apartments.) Murray and I were the first of our group to arrive for lunch, so we had a half hour to talk to the Ambassador. He is a most interesting man, who has spent his life specializing in Russian affairs. He has a very charming wife; I sat next to her at lunch, which was served at card tables. We had martinis and sherry before lunch, and a delicious American meal. No one refused the offer of second helpings. The coffee was a special treat—all foreign coffee tastes bad to an American. Mrs. Bohlen told us lots of interesting things about her many years in Russia.

Later in the afternoon, I'm in a meeting, and a Chinese physicist is now speaking from the rostrum. Another Chinese is translating the first's Chinese into Russian, and we are hearing the Russian translated into English in our earphones. (The Chinese fellow spent years in Berkeley and speaks excellent English. He had probably been instructed not to speak in English, and so most of what he had to say was lost in some of the worst translating we have seen so far.)

I left the Lebedev Institute in the middle of the last session of the conference to go to the Bolshoi for a performance of *Carmen*, sung in Russian. We had our usual box, but I didn't think the singing was very good, so I came home at the end of the second act. I had dinner, and came up to my room, where I've played the piano for an hour. I shall have to insist on having a piano in all future hotel rooms—it is very relaxing, and I sleep much better for being able to play it before retiring.

WEDNESDAY morning. Moscow Physical Institute. (This is where the Russian controlled thermonuclear work is carried on.) Artzimovitch is greeting us in the conference room. On the wall back of him are three large paintings—Marx, a man unknown to me (in the center), and Lenin. I wonder how long ago they took down Stalin, and where they found the replacement picture? They have a 1.5-meter cyclotron, reactor, hot lab, isotope separators (electromagnetic method), and new methods of accelerating particles. Segrè asked if we could see the gas discharge work which Kurtchatov talked about at Harwell. Artzimovitch said he can talk about it, but not show it to us. We had an extended tour of the facilities (most of the work here is classified so we saw only a small fraction of the lab), and when I was about to go to the bus Academician Artzimovitch invited me to lunch at his home. The other foreigners were Peierls, Segrè, and Pickavance. There were twelve of us at the table, including Mrs. Artzimovitch. They live in a two-story stucco house, much like that I was in last week. It is apparently the standard residence of a Soviet big-shot scientist. Mrs. Artzimovitch reads a lot of English novels in the original, but she hasn't had much practice in speaking. She has read *Gone With the Wind* twice, and has a lot of English and American detective stories in her library. Apparently there are almost no Russian detective stories, and the few are not very good. Our festive lunch lasted 3½ hours, instead of the usual 2½, and we went

directly from it to the final banquet of the conference, which was held at the National Hotel. Those of us who had been to the earlier private banquet sat through the first six or seven courses without touching a thing. At both dinners, we had five different wine glasses at our places, and at both we managed to use them all once or twice, at least. I've just come from the second banquet, which broke up at 11 P.M. So I have been sitting at a dinner table for a good part of the last eight hours.

Pontecorvo was at the Institute this morning—he said he had never been there before, and took the opportunity to do so when there was a tour. The British scientists from Harwell were almost trapped into having their picture taken with Pontecorvo. He and a photographer came toward them as they were going through a door. They beat a hasty retreat. They would have taken a beating in the British press if the picture had been taken. ("Harwell Scientists Fraternize with Pontecorvo.") Normally the place is as closely guarded as Livermore—both do roughly the same kind of work. Pontecorvo made several attempts to talk with Segrè, and finally succeeded. The British physicists wouldn't talk with him. They are angry at him personally, for what he did to British-American cooperation in atomic affairs.

The Moscow Physical Institute is at the western edge of the city—all the other Moscow labs are near the University in the southeastern part of the city. The Institute is run by Academician Artzimovitch and Academician Kurchatov, who gave the famous speech on controlled thermonuclear reactions at Harwell, England, during the visit of Bulganin and Krushchev to England. He is sick and couldn't be with us. We met his two daughters during the afternoon. The American delegates had a press conference this afternoon, but I haven't heard anything about it, except that there were only two reporters present. All the others went to the wrong place.

THURSDAY. This morning, we drove out to the Russian atomic power plant, which is said to supply 5000 kilowatts to the main power lines. Some other visit-

ing group has taken over our fancy Austrian busses, so we were reduced to riding in a smaller, less comfortable Russian bus. The top speed of the bus was 40 kilometers per hour, or about 25 miles per hour. We seldom hit the top speed, so we toiled along at about 20 miles per hour most of the time. It took us $4\frac{1}{2}$ hours to get to the power station, and it wasn't very interesting after we arrived. It is much more interesting to visit a research nuclear reactor than one whose only function is to make power. We all felt that this trip was the only one so far that we would have been happy to skip. When we arrived, we were shown a moving picture, with English dialogue, about the station. I had already seen the picture—the AEC obtained a print of it at the Geneva meeting last summer, and it was shown at the Radiation Laboratory this year. We toured all through the plant, but they forgot to show us the steam turbine driven electric generators. But we did feel a lot of heat from the steam pipes, and this heat was generated by the splitting of uranium nuclei, rather than by the burning of ordinary fuel. The control room of the reactor was fairly interesting, and had some features which were novel, at least to me. After the tour, we went to another building, where the standard banquet was set. I sat next to the manager of the plant, and responded to his toast. I am becoming quite used to getting up at the drop of a vodka glass, and giving a toast to international friendship among scientists. After two hours, we were told that cars had been sent out from Moscow to drive us home. We had three Zims, which hit 100-110 kilometers per hour most of the way home, so we made it in less than two hours, and very comfortably. Before the lunch, we signed the visitors' book. I have never seen so many different languages written in a single book. In our small party were two Chinese, an Egyptian, an Indian, a Yugoslav, a Czech, some Russians, English, and Americans.

The drive was to the southwest of Moscow, more than half of it on the road to Minsk. We passed many collective farms, which all look alike. We also passed a state farm, which looks more like a large American farm, with many good-looking buildings, and more farm machinery than we have seen in one place before. The workers on a state farm are paid salaries, whereas the collective farmers are not. The country through which we drove was overrun by the German army in its drive to Moscow. The Germans drove past Moscow on the north and south, but they never closed their pincers around the eastern side of the city. We didn't see many signs of war, but there were some tank traps and barriers. The country is rather heavily forested with small trees, so the Germans must have had to keep to the roads. We drove past a fighter plane airfield where there were more than 50 MIG's parked along the runways. We saw several of the MIG 17's taking off, and others flying in formation. There was a large army base near the power reactor. We weren't told what was going on in the busy industrial community near the power station.

When I returned to the hotel, I put away my camera and walked several blocks to the Savoy Hotel, where my old friend Bill Moore and his wife are staying. Bill was



"... we drove out to the Russian atomic power plant."

my roommate at college, and has been the Washington correspondent of the *Chicago Tribune* for a number of years. I hadn't seen him for more than twenty-five years, so we had a fine reunion. The Moores live in a small apartment in the Savoy, and cook their own meals there. They have been here for several months, and hope to be relieved in the fall. We sat and talked for a couple of hours, and then I invited them to the Moscow Hotel for a snack and to see my room. They had never been in the hotel before; until very recently Americans didn't stay here. The three tourist hotels for Americans are the Savoy, the National, and the Metropole, but this summer "intourist" travelers will be booked into the Moscow as well. We had coffee and cookies in the large dining room and then went up to my room, which they thought was most impressive. The moon was full, and over one of the red stars on the Kremlin towers, so I took a picture of it, which I can use to close my lectures on Russia. All of us are prepared for a bunch of lectures, when we arrive back home as "experts".

FRIDAY. Today is my last day in Moscow—I leave for Leningrad at midnight on the train. This morning, Nick drove me in his car to the Moscow State University. This is the most imposing building in the whole country and it dominates the Moscow skyline. The tower is over 800 feet high. There are 16 000 students and all but 1000 of them live in the skyscraper. There are 2000 students majoring in physics and, of these, 500 are girls. The dean of the Physics Department showed me the lecture halls, the demonstrative apparatus, and some of the teaching laboratories. Everything was absolutely first class. The apparatus was on the whole much better than ours for the same courses. But the University was only built in 1953, so everything is new. We still use lots of equipment that is thirty years old, because it works well. We went through some of the students' rooms—they are in pairs with a common shower and toilet facilities. Each student has eight square meters for himself, which is enough for a bed, a study table, and a bookcase. In addition to the main dining room, each corridor has its own small kitchen, where the students can prepare snacks for themselves. We were shown the gyms and the swimming pool, where two swimming classes were being held. A group of children was swimming at one end of the pool,

and at the other, a group of college boys and girls was being taught by a nice looking girl instructor. Then we went up to the top of the tower, where we had a spectacular view of Moscow. We could see the whole city—I hope my pictures will capture some of the effect. There is a tremendous amount of building underway in the southern part of the city. There are literally hundreds of large apartment houses going up. Each new construction project is surrounded by four of the cranes which are so typically Russian. The weather has been perfect for picture taking today; the sun is out, and there are very few clouds in the sky.

Coming into the hotel this afternoon, I saw a huge crowd surrounding a car parked alongside our usual Zims. People were packed three deep all around it. It turned out to be a two-toned 1956 Chevy. I am sure that no one would believe that it is one of the least expensive regular American cars.

Before dinner, four of us went to see a Russian 3D movie. It was quite good; no glasses were required, but you had to keep your head in the same place all the time. It worked like the advertising signs we sometimes see in store windows. I wouldn't have understood very much of it if Nick hadn't been along to translate things occasionally. The theater was very small; there probably weren't over 250 people in the place. After we came back to the hotel, Nick invited me to have a cocktail with him at the bar. We hadn't seen the bar before, as we always had wine on the table. He ordered a couple of Internationals, which consist of equal parts of brandy, vodka, and chartreuse. It was very good; it reminded me a lot of Southern Comfort. I am now packed, and will check out in a half hour. We and our interpreters have certainly been enjoying each other's company a lot. They have done so much to make our visit pleasant, and they have had a lot of fun with us, too.

WE went to the big railroad station, to take the train to Leningrad. This railroad line was built in 1851, and was the first in Russia. The train was a modern European type, and I shared a large compartment with Dr. Sorenson of Oslo. We each had a lower berth. The road bed was very smooth, and the train started on time and arrived on time. We were served tea and a piece of bread and cheese in the compartment for breakfast. A two-star

The Moscow State University with its 800-foot tower. "... There are 16 000 students ... 2000 students majoring in physics and, of these, 500 are girls."



Russian general had the next compartment with his wife. He had seven rows of campaign ribbons on his uniform. We were met at the Leningrad station by our interpreters, who had come up the night before with some of our American friends.

After checking in at the Astoria Hotel, we had a regular breakfast, and then drove to the Hermitage. This is one of the best art museums in the world. One of our party, who is an expert on art, said that the only other museum which can compare with it is in Madrid. The Hermitage is considered to have a much finer collection than the Louvre or the Florence gallery. The Hermitage takes up more than half of the czars' "Winter Palace". The art treasures were collected over the centuries by the czars, for their personal pleasure. The galleries were only opened to the public after the revolution. The rooms are spectacularly built and decorated. All the floors are of beautifully inlaid hardwood—we must have seen an acre of these beautiful floors. Most of the walls and ceilings are of marble, and they are elaborately carved and decorated with gold leaf. We only visited the galleries hung with paintings of the old masters and the French impressionists. I looked in the catalogue as we went along. In one room, it noted one painting by Leonardo da Vinci, but I found two by him. I can't think of any other museum which would neglect to mention a Leonardo in its catalogue. We went into one room which had forty-five Rubens paintings in it. The next room had thirty-five Van Dycks. The collection of twenty Rembrandts was in Holland on loan, but there were a couple on the wall of one room. In the modern department, they had a room full of each of the following painters: Van Gogh, Cezanne, Gauguin, Renoir, Degas, Picasso. The Gauguin room was filled with his Tahitian work—about twenty-five in all. It was a most impressive tour.

After finishing our art tour, we went through the other rooms of the Winter Palace. We saw the same unbelievable splendor we had seen in the palace in the Kremlin. One large hall was covered with portraits of the generals who beat Napoleon in 1812. They even had a large portrait of Napoleon at the end of the hall. We saw Peter the Great's throne room, and the private apartments of the czars.

We took a long leisurely walk through some parks, and along the river, on the way back to the hotel. I took a lot of pictures of children playing in the parks. There is more color in the clothes of the people here, and they seem to smile more than the people of Moscow.

After lunch, we went for a boat ride up and down the Neva River. Both sides of the river are lined with imposing buildings; Leningrad was for many years the seat of the government. In the evening, we went to the opera house for a performance of *Rigoletto*. It was very good—much better than the two operas I saw in Moscow. The opera house is almost a duplicate of the one in Moscow, but slightly smaller. We sat in the middle of the second row of the orchestra section, so we had a fine view of the stage, and could see into the orchestra pit. The scenery and costumes were beautiful, as in Moscow, but the voices were much better.

SUNDAY. I am going to take a very roundabout way to Stockholm. Until a few weeks ago, there was a Russian flight from Leningrad to Helsinki, where one could take SAS to Stockholm. This whole trip took three hours. But now I have to leave here at 3 AM for Riga, and wait there until the afternoon for a flight to Copenhagen. Then if I'm lucky, I'll get a plane from there to Stockholm. The trip will take about fifteen hours, if I make good connections in Copenhagen. The airlines of the Western world don't have offices here, so it is impossible to reserve tickets. I thought I might take a train to Helsinki—it is only forty-five minutes by plane (when the planes fly), but the train takes fourteen hours. So it looks as though I won't get any sleep tonight.

We drove to the airport at 1 AM, and the sky was still quite light. Very few of the cars on the road had their lights on. We flew to Riga in an IL-12 belonging to Aeroflot, the Soviet airline. We snatched a few hours sleep in the airport beds we used two weeks ago. After breakfast, the SAS plane from Moscow to Stockholm arrived. I am now waiting while the passengers have their passports checked. As soon as you arrive anywhere in Russia, they take your passport away, and they may keep it for a few days. They tell us we will get our passports and tickets back after we are on the plane. They have just put my bag on the plane, so I guess it won't be opened for inspection. As official guests of the government, we escaped baggage inspection both coming and going.

We had a good flight from Riga to Stockholm. It was wonderful to see a bit of the Western World again, in the shape of an aeroplane that was spic and span inside, with good service, and well-dressed people. The plane was full of late copies of *Time*, *Life*, *Look*, and English and American papers. We devoured the literature like starving men. As we flew in over Stockholm, it was quite apparent that we were in a different civilization. Everything looked so clean and neat, and there were so many cars on the roads and on the streets. And then when we drove through the streets—the women! Sweden is famous for its beautiful and well-dressed women, but I am sure they never have such an appreciative audience as they find in a plane load of Westerners from the Soviet Union.

NOW for a few general observations, and I'll sign off. My impressions of Russia are not very different from the views I carried in with me. This just means that our American reporters have done a good job in keeping us informed about the situation there. I was most surprised by the complete lack of hostility toward us as Americans. I expected the scientists to be friendly, but I was prepared to find the man in the street unfriendly. Of course, everyone knew we were foreigners from the Western world, and many could tell from our speech, that we were either English or American. Several of our party were stopped in the street by English speaking strangers, who expressed the view that things weren't good yet, but they were getting better. Everyone we talked to—Embassy officials, newsmen, Russian scientists, interpreters, and Russian speaking visitors from the Satellites—were in agreement that a big change has

FILLING A NEED...

During the nineteenth century, the mechanics of fluids branched off the main stem of physical science. Physics concentrated on the elaboration of the structure of molecules and their components; the development of fluid mechanics was guided by the need for understanding the macroscopic phenomena associated with ships, turbines, airplanes, etc. The separation between these disciplines has been reflected in the organization of university departments for several generations, so that there is little contact between physics and fluid mechanics departments. This lack of contact has been reflected in our scientific graduates who typically have been trained in one or the other of these disciplines, but almost never in both.

Very suddenly, however, the country faced an important problem when we had to meet the challenge of rapidly creating an operable intercontinental ballistic missile. The re-entry of this missile into the earth's atmosphere was regarded as a very difficult problem; largely because here, for the first time, we faced a scientific problem involving the mechanics of a fluid closely coupled with important aspects of molecular physics. The Avco Research Laboratory was created to fill this need. Its senior scientific personnel were trained in classical aerodynamics, atomic physics, and physical chemistry, and saw in this interdisciplinary area a unique opportunity to broaden their background and to make creative contributions in a field in which the great advances are still to be made.

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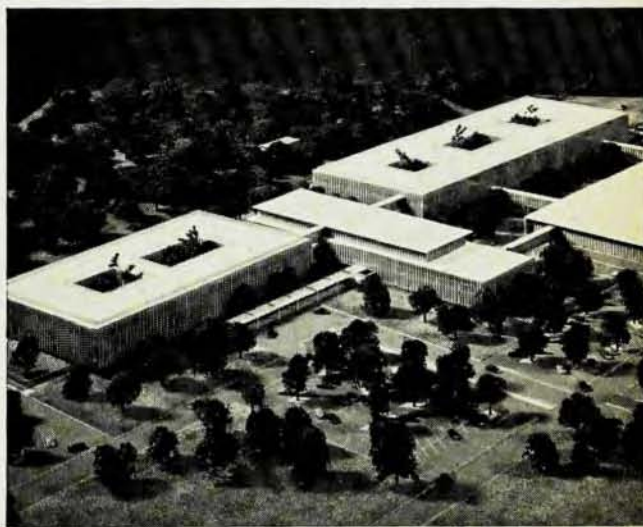
Dr. Arthur Kantrowitz, Director
AVCO RESEARCH LABORATORY
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Dr. Arthur Kantrowitz



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come over the people since the death of Stalin, and more particularly, since the debunking of the Stalin myth. The BBC broadcasts are no longer jammed—this only means that more jammers are available for the wave-lengths that the Voice of America uses. People are beginning to find more about what really goes on in the outside world, and they are realizing that they have been fed a huge dose of lies for many years. They can blame all this on Stalin, and still keep their faith that the Communist system is better than ours.

One of my interpreters told me of seeing a newsreel short on San Francisco. She was most impressed by the homes, the way people dressed, and by the number of automobiles, and the elegance of the autos. Such an educational experience is irreversible—after people have seen such a movie, you can't go back to telling them that they are better off than everyone else, and that the people in the Western world are exploited and in a semi-starving condition. The Iron Curtain, in my opinion, was erected largely to keep the Russians from finding out about the Western world, and not vice versa. In the past few months, three Russian scientists went to the Rochester Conference, fourteen Americans came to Russia, and next month, fifty Russian scientists go to Geneva. With them will go ten or twelve interpreters. The impressions these people bring back will spread through the country. The delegations of farmers and industrial workers to the US will similarly diffuse their impressions of America through the country. The Russian leaders must know they can't stop this, so the fact that they have let it begin is very significant. I was particularly impressed with a story I read of the Soviet farm delegation to Iowa. They had been shown through towns and farms that were magnificent beyond their powers of comprehension. They thought they were being given the treatment American visitors to Russia get—they are shown the one collective farm that is kept as a show piece for foreign visitors. (There is a tradition about this in Russia, where Catherine the Great was fooled in her trips through the country by troupes of well-dressed peasants, who rushed from place to place ahead of her coach, and were always playing happily in the streets when she arrived.) So the farm delegation got up early one morning, and had their driver take them to a place twenty miles off their scheduled route. They found the same well-stocked stores, the same fine automobiles, and when they knocked at the doors of the same well-painted farm houses, they found the same refrigerators and new stoves in the kitchens. My guess would be that this is the most important observation they will carry back with them. The farms we saw were so incredibly primitive, and the little farm machinery so old and rusted, that it is no wonder that the Russians have a hard time feeding their people. Things must be better in the Ukraine, but I feel sure that even there, things must look very primitive compared to an average American farm.

MY general impressions of high-energy physics are these: the Russians are making a crash program in this area. As I have said before, money is the last thing

they think about, so far as equipment is concerned. The training of scientists is also on a crash basis, and the rewards for being a scientist are very substantial. According to Panofsky's information, the following monthly wages are paid in the Soviet Union:

Unskilled worker	400–600 rubles
Skilled worker	800–1200 rubles
Bachelor of arts	1300 rubles
Graduate student	2000 rubles
Professor (junior)	4000 rubles
Research professor	up to 30 000 rubles
Corresponding member of academy	add 3000 rubles
Full member of academy	add 6000 rubles

(Note that when one is elected to the US Academy of Sciences, the only financial change is that one is charged ten dollars a year in dues!)

At this moment, the Russian high-energy physicists are repeating all the experiments done in the Western world, and extending them to the higher energies available at the Volga lab. Their work appears to be very well done, with good accuracy, on excellent equipment. The big question mark is this: of the huge pool of technically competent people, what fraction will be able to do original work, when they have completed their big program of training on previously done experiments? Although I heard of some very novel, and even brilliant ideas in the field of machine design, I didn't see or hear of a single new idea for an experiment in nuclear physics. I feel sure that some of the new crop of experimental physicists will be able to think of ideas for new experiments, but I don't know how favorable the climate will be for them to try them out. The Russians operate on the German system, with one "Professor" per institute. If the professor isn't receptive to the ideas of the younger men in his institute, he can keep them from doing original things. The sense of competition between the various institutes is very keen—the arguments in the meetings between representatives of various institutes were often quite heated. With the great financial rewards for success, it is possible that the spirit of cooperation between men in a particular institute may be hurt by jealousies. In any case, we will have to wait to see whether the new men are only competent technicians in high-energy physics or whether they are real physicists. My guess is that there are at least a few really good physicists, but that the "trade school" type of training they receive may hurt the development of originality. The beautifully set up series of experiments at the 680-Mev machine is most impressive to a Westerner, but after some thought, it might indicate a bit too much regimentation. The touch of anarchy we see in our labs is really a good thing for the advance of physics. No director can think of everything, so he must trust his young people to try their own ideas, even if most of them are no good. If, in a few years, the present Russian system doesn't produce anything new, I am sure they will follow our lead, and let their good young people try their own ideas.

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I am most encouraged by the fact that the Russian leaders are travelling to various parts of the Western world. Most of them have grown up on the lies told in the Russian press about our way of life. I can hardly imagine the shock it must be to a Russian to land in Stockholm for his first visit outside Russia. After hearing all his life how much better off he was than anyone else, he would see at a glance that it just wasn't so. Formerly, there was nothing to be done, but now with Stalin as the scapegoat, the situation can be improved. By the way, I don't remember hearing Stalin mentioned more than once or twice in my stay there. Lenin is still a deity, but everyone wants to forget Stalin.

The Russian leaders have said that in view of the existence of hydrogen bombs, wars are no longer possible. I believe that they mean this; I do, and I think it is an inescapable conclusion. This means to me that they can now devote a real effort to improving the living conditions of their people. After all, by Western standards, the average Moscow resident is very underprivileged, and the living conditions on the average collective farm (at least within a hundred miles of Moscow) would give a Southern sharecropper the creeps. All the five-year plans so far have been devoted to the development of basic heavy industries. One of these days, the Russian leaders will be forced to have some five-year plans devoted to the improvement of the living conditions of the people. When they start, it will keep the people busy for a long time, and it should ease the tension between East and West. I can't see any reason why Russia, if she puts her mind to it, can't rebuild her cities in ten years, just as has been done in West Germany.

The reporter from the *Christian Science Monitor*, whom I met in Moscow, said he was going to write a series of stories on Russia, and the punch line was going to be "All the time I was there, I had the queer feeling that I wasn't being followed." We are all quite sure we weren't being followed, and in fact, no one even looked through our baggage when we were out. They had a perfect opportunity, as we were taken away in busses each morning, and wouldn't get back until 2 P.M. Each of us arranged something to tell if our bags had been opened, and when we compared notes, no one could say that his had been tampered with. We had all been told that this was standard procedure in Russia, and that we could just be sure we would be watched all the time. But in the last few months, this sort of thing seems to have eased off a lot. The scientists said that a year ago, you never saw anyone with a camera, but now, lots of Russians were photographing the sights in town, and in the country. Russia has a long way to go in so many ways, but every time you look at a bad situation, you find it is improving. It is this slow but steady improvement which has kept the Russian people relatively happy since the revolution. Dr. Weisskopf, who spent a year in Russia in 1936, said that his first impression of Moscow on this trip was that everyone was well dressed. (I was really shocked to see the people on my first day, but after a week or so, they all looked fine to me.) In 1936, according to Vicky Weisskopf, about every tenth person had rags wrapped around

his feet in place of shoes, and almost everyone had his clothes patched in many places. For people who remember such conditions, things must look pretty good now. But, with the improvement in communications between East and West, a lot more improvement will have to take place if the people are to remain content.

Lyle Smith told me of a conversation he had with his interpreter. Lyle was telling about his family, and mentioned that his eleven-year-old boy had a paper route to earn money. The interpreter said, "Don't you earn enough money to support your family?" He had heard stories about the exploitation of children, and of the near starvation of the people. Lyle explained that the boy wanted a new bicycle (he already had one), and his father thought he ought to earn the money for it himself. He had to spend quite a lot of time explaining that the money the boy earned didn't go for groceries and clothes for the rest of the family. And he was never sure that he got his point across. I didn't see any children working, but I never quite got used to seeing the women doing hard manual labor. They repair the streets, dig ditches, and tighten the bolts on railroad rails. On the collective farms, you see them walking down the road carrying a pair of buckets of water from the ends of a beam on their shoulders. The street sweepers are all women, and they sweep all the time. The streets are kept very clean. The standards of sanitation appear to be good. None of our party had any of the digestive troubles we normally get on a trip to Mexico. I was surprised that with such a drastic change from my normal diet, I didn't have any trouble.

One of the most characteristic things about a Russian street is that pedestrians don't pay any attention to the traffic lights, but autos do. I have seen two or three hundred people in the crosswalk near our Moscow hotel, when the light was against them. Cars approaching such a crowd honk their horns, and don't slacken their speed a bit. It is up to the pedestrians to get out of the way. Several times, when driving in a car, I've been sure that we would hit a pedestrian, but we always missed—sometimes by inches. The game is played by having the driver go straight ahead, at full speed; the pedestrian can then tell which way to jump. If the car tried to dodge, the pedestrian might jump the wrong way and be hit.

The Russian streets are extremely wide. When they have as many cars as we do, they won't have the traffic jams we are used to. There is a special lane marked off down the center of the main streets. This is for the cars of the highest government officials.

Every morning at 10 A.M., the queue for the Lenin-Stalin mausoleum formed. Even on week days, it stretches west along the north wall of the Kremlin, and halfway to the south, along the west wall. On Sundays it is even longer. I counted several hundred people, and estimate that on a week day there are usually 10 000 people in the queue, and on Sundays, many more.

The conference was a great success, and I think our visit did a lot of good for both sides. We all certainly have a much better idea of what goes on behind the Iron Curtain, and I believe that we were good ambassadors of good will from the Western world.