

The Weizmann Institute of Science Sixty Years of Achievements

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celebrating the 60th anniversary of the Weizmann Institute**

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Ladies and Gentlemen, Dear Friends.

It is customary, in the scientific world, to celebrate the 60th birthday of a prominent scientist. The normal routine is to hold a scientific symposium, in which the colleagues, the former students and sometimes even the PhD thesis advisor of the 60 year old "Bar-Mitzvah boy", are giving talks related to the life achievements of the distinguished scientist. As I gracefully age, I find myself participating in more and more such events, often being invited to address the gathering. I have developed my own special formula, guiding me as to what to say on such an occasion. I believe that the proper mixture is about 30% facts, 30% admiration, 30% nostalgia and 10% anecdotes. This seems to work well, in most cases. Today the birthday boy is not an individual scientist. It is the Weizmann Institute and its forerunner, the Daniel Sieff Institute. Nevertheless I will try to pursue the same winning formula.

As we look back at these years, it is extremely important to understand the background in which our story is evolving. This is not a normal Institute, in a normal country, at a normal time period. Allow me to begin with a brief encapsulated history of almost 200 years, describing the circumstances that led then, and accompany now, the Weizmann Institute of Science. With your permission, I will do so in a very personal way, relating the events to my own family history and to my own association with the Institute. I will also touch briefly upon the connection between France and Israel. After all, we are celebrating the anniversary here in Paris.

It was around 1820, Napoleon's time, when my first ancestors arrived in the holy land. By 1860, they lived in Jerusalem and Jerusalem already had a Jewish majority. In 1870 a group of French Jews established the first agricultural high school, Mikve Israel, which was later the high school attended by my grandfather Haim Harari. In 1890, the town of Rehovot, where the Weizmann Institute is located, was founded by a small group of Jews led by a certain Aharon Eisenberg, who was my great-grandfather. In 1897, the thirteen year old Haim Harari arrived by boat, alone, to Jaffa, the last member of my family to reach the country. In 1903 the first trade union was established in the holy land. It was the trade union of the Hebrew teachers, and one of its founders was my grandmother, Yehudit, daughter of the said Eisenberg. She married Haim Harari three years later. In the meantime, Chaim Weizmann paid his first visit to the country and, while in Rehovot, stayed overnight in the house of Eisenberg.

In 1909, exactly one hundred years ago, the city of Tel-Aviv was founded in the sands, and we have been celebrating this anniversary last month. Tel Aviv was founded by 66 families, one of which was my maternal grandparents, the family that arrived in the Napoleon era, and another one was my paternal grandparents, the Harari family. In 1912, my grandfather, Haim Harari, left the small city of Tel-Aviv to Paris to study towards a doctorate in literature in the Sorbonne, and you can imagine that his French was much better than mine. Dr. Haim Harari and his family were Turkish citizens, because the area that is now Israel, Jordan, Syria and Lebanon was part of the Ottoman Turkish Empire. During World War I, they found themselves being enemy citizens in France because Turkey, as you know, was on the German side. They somehow escaped to Switzerland and returned to the holy land in 1917, when the British conquered the country. That was, of course, the year in which, on November 2nd, Chaim Weizmann, in London, obtained from Lord Balfour the famous declaration about the establishment of a Jewish Homeland.

In 1921, in the town of Rehovot, on a small part of the land which now belongs to the Weizmann Institute, an agricultural research station was founded by the Jewish community. This was the first scientific research establishment in the country. One year later, the Technion, the technical university in Haifa, was founded and three years later, Chaim Weizmann initiated the creation of the Hebrew University in Jerusalem. So, as 1930 arrives, we already have many Jewish towns and villages, including Rehovot and Tel Aviv, two universities, an agricultural research Institute, theatres, trade unions, Kibutzim, Hebrew speaking high schools, and the first two Intifadas in 1921 and 1929.

The next event, largely ignored in the history books, was quite an unpleasant dispute between the leaders of the newly formed Hebrew University and Dr. Weizmann, who was actually the visionary founder of the University. This conflict, directly or indirectly, politely or impolitely, led him to establish his own separate scientific institute near the agricultural research station in Rehovot. He convinced the Sieff family in London to help him financially and to establish the Daniel Sieff Institute in 1934, not before he bought a piece of land, nearby, and built his own private house on it. The house was built with the income he earned from his intellectual property, based on his invention concerning Acetone. Part of that money, was used to buy the land for the house. And who sold the land to him? My grandmother Yehudit, the daughter of Eisenberg, who owned a vineyard near the Agricultural Research Station! So it is Chaim Weizmann's scientific work and its commercial fruits, which indirectly allowed my grandparents, Yehudit and Haim Harari, to build their house in Tel-Aviv. Incidentally, all of this money is long gone.

Jean-Marie Le Pen on the far right, Hugo Chavez on the far left, and Mahmoud Ahmadinejad on the far bottom, are now telling everybody that the holocaust never happened. They also tell us that, as a result of the holocaust that never happened, the Jews came and stole the land from its inhabitants. But you may have noticed that in our story, I have only reached 1934, with two universities, two additional research institutes, theaters, unions, Hebrew high schools, Hebrew newspapers, all of them Jewish, and nothing equivalent done by anyone else in that same country. The lie about the holocaust itself is not very dangerous because very few people believe it, and it relates entirely to the past. But the lie that all of this flourishing community

evolved only after the holocaust, is the bigger and more dangerous lie. This second lie is believed by many uninformed people, and it is very relevant to the present and the future.

The Sieff Institute, established in 1934, celebrated, one month ago, its 75th anniversary. It served as a refuge for several German Jewish scientists who escaped Hitler in time, but it was a very small Institute, one, and later two, buildings, dedicated to one field of science. The rest of the story is better known. In 1944, on the 70th birthday of Chaim Weizmann, his American Friends and admirers, who entered the picture for the first time, led by Meyer Weisgal and Dewey Stone, decided to establish the Weizmann Institute by expanding the Sieff Institute. The Sieff family, in a very noble gesture, agreed to change the Institute's name from Sieff to Weizmann, while keeping the Daniel Sieff building, the first building on campus, with the name of the Sieff family.

I do not know if you have noticed that the Sieff building has two little wings on its two sides. These were totally unnecessary to its scientific functions. But the building was designed by a British architect, who specialized in building train stations in India. In such stations there was a waiting room for the Muslims and a waiting room for the Hindus and every such building had two box-like structures on its two sides. When you next visit the Weizmann Institute, take a look at the Sieff building. Today, there are both Muslims and Hindus on campus, but none of them is waiting for a train in the Sieff building.

The year 1949, Weizmann 75th birthday, was to have been the opening of the Weizmann institute, with its first five scientific departments. But in the meantime there was 1948, the declaration of Israel's independence and the war of independence. When the Institute was finally opened in November 1949, it was already in the State of Israel. It had five new departments led by five remarkable scientists to whom we will return later, when we mention some of the real heroes of our story. The precise date of the 60th anniversary of the Weizmann Institute is November 2nd, 2009, half a year from now, and 92 years, to the day, after the Balfour declaration. So our current meeting in Paris is really only the celebration of the 59.5th anniversary of the Weizmann Institute.

When you hold these scientific symposia, honoring the birthday of some elderly scientist, it is customary to say: I remember him from this and that age. Well, I remember the Weizmann Institute since it was eleven years old. When the Weizmann Institute was eleven, I was twenty and I arrived at the Institute as a student towards the Master degree in Physics. In the fall of 2010 I hope to celebrate the 50th anniversary of my arrival.

Two months before the 1967 Six Day War, I was appointed a tenured Professor. But there is no written record in the files of the Weizmann Institute that I have a permanent position there. During the waiting period prior to the Six Day War, the administration was chaotic, many people were drafted into the army and no one remembered to write to me the formal letter saying: "You have a permanent position". One of the most minor results of the Six Day War is that 42 years later, I can still be fired from the Weizmann Institute, without too much trouble. Luckily, no one noticed.

Twenty years ago, I had the honor of becoming the eighth President of the Weizmann Institute, the first one that was born in Israel and the first one that was younger than the Sieff institute. In 2006 Daniel Zajfman became the tenth President of the Weizmann Institute, the first one that is younger than the Weizmann Institute itself. He was a one year old baby, when I arrived at the institute. So the generations are changing, but the story continues.

Needless to say, I have skipped, in my story, an endless number of events, good, bad, and indifferent. But it is important to understand that all of this scientific development is happening with a background of permanent struggle and with a pool of potential scientists which is very limited. It is an endless chain of political events, wars, tragedies, achievements, triumphs, terror, economic troubles, industrial development and what not.

We never had the option of just writing a letter to a promising scientist in Sweden or in Oxford or in Los Angeles, having nothing to do with Israel, and say: We would like to offer you a position at the Weizmann Institute. The pool that might even consider coming to work at the Weizmann Institute has always been very small, and when you add to this limitation the political and strategic background, you have two enormous obstacles, leading you to appreciate even more the achievements of the Institute.

The Weizmann Institute is based on a certain "formula". You may give yourself an assignment: Name all the research institutes in the world which have the following four features: First, it is an institute of basic research. Second, it covers all the fields of the natural sciences in one campus, plus excursions into engineering, agriculture, medicine and other technologies. Third, it has its own graduate school. Fourth, it has no undergraduates. Now look at all of the institutions in the world, adhering to this formula. I have good news and bad news. The good news is that the Weizmann Institute is the best among all of these institutes in the world. The bad news is that it is probably also the worst among them, because it is the only one! I cannot think of one other research institute in the world that covers all the fields of science in one campus, has its own graduate school and no undergraduates and is dedicated to basic research.

There are other famous, wonderful Institutes, and some of them may be better than the Weizmann Institute, but none with the same formula. There is the Max Planck Society in Germany, but they have 70 or 80 campuses in different locations, and each one is dedicated to one specific field. There is the excellent Pasteur Institute here in Paris, essentially dedicated to the Life Sciences. There is the fantastic Rockefeller University in New York, again, almost entirely in the Life Sciences. There's CERN in Geneva, only physics with little glimpses of other topics, and no Graduate School. There is Caltech in California, one of the best places in the world, but it has undergraduates. So, for better or for worse, the Weizmann Institute is based on a very unusual and unique formula, which has been one of its secrets of success.

The Weizmann Institute has another special feature: a self-induced, deliberate schizophrenia. That is one of its main "secrets". It is as international as can be, and as Israeli as can be, at the same time. Everything the Weizmann Institute is doing in science is for the whole world, whether it is inventing a new drug, a new discovery in Physics, something in Computer Science or any other result of basic research. There is absolutely nothing specifically Israeli about its science. Science is truly

international, knows no flags and no boundaries. It is a gift and a contribution from the Institute and from the country to the world. At the same time, the Institute makes an enormous contribution to the State of Israel, first and foremost to its industry and economy, then to its educational system and we will say more about it later. Indirectly, it also contributes to its defense. The Institute is not performing any defense research, but some of its leaders have been making enormous contributions to the defense of Israel as consultants, advisors and by fulfilling various positions. In fact, the Institute contributes to every facet of life in Israel and I will mention some of these contributions later.

My claim has always been that, if we were only international, there would be no right for us to expect such a strong support by the Israeli government and by the Jewish people, but, if we were only Israeli, we would never have the quality that we would like to have and which, hopefully, we do have. It may be schizophrenia, or duality, or a case of multiple attention, or a double-face; you may call it as you wish. But it is the harmony between the international flavor and the Israeli flavor, which makes the Institute tick.

Today, in the globalization era, to be international is not so difficult. We are doing everything in English on campus, which is non-trivial, especially when you discuss it here in Paris, but it is not such a big effort. But, when I came to the Institute for the first time to work on my Master thesis and then on my PhD thesis, there were no personal computers, e-mail, cheap international phone calls, and not even a Xerox machine. Nevertheless, even then, nothing could happen in the world of Particle Physics without us students knowing about it, perhaps not within a day, not within hours, but within a week. That was good enough. These were the hottest days of Particle Physics. Every week there was a new important development somewhere, and, in the early 1960's, we were completely "plugged" into the international scene.

When I came to the United States as a Post Doctoral fellow, a few years later, and I started giving seminars in various places, I found, within the United States, and I will not mention names, reasonably good universities that were much more isolated than we were. I then learned that scientific isolation is a state of mind, not a geographical fact. We had this starvation for the international contact. In Israel in the '50s, traveling abroad was almost considered a crime against the country. But the Weizmann Institute knew how important it was to bring numerous visitors to the campus and to travel frequently to conferences, because we understood that you cannot play in the international league without playing both at home and away against, or with, your international scientific competitors and partners.

You simply cannot compete without being there all the time and establishing strong ties with American science, with French science, later with German science, and all of these connections were developed very early. There is hardly a scientific country in the world that does not collaborate with us today and, at some point recently, the statistics was that 35 percent of all the papers published by Weizmann scientists have at least one co-author from an Institution in another country! This is a huge percentage for anyone, but more so for an isolated little island like Israel, which is three hours away by flight from the nearest acceptable level of science. So, that was a real achievement from the very beginning. Today it is not such a big deal. There is e-

mail, there are cheap phone calls and video conferences, but, in the years that the Institute was created and formed, it was very important.

The person who, more than anyone else, created the Weizmann Institute, was, of course, Meyer Weisgal, the right hand man of Chaim Weizmann. Weisgal was a great entrepreneur, fund raiser, story teller and Schnorer, a person who spoke several languages, all of them in Yiddish, but knew absolutely nothing about science. One of Weisgal's favorite stories, which he often told years later, was that, whenever he would travel abroad for fundraising, he would collect the Institute's scientists and tell them: "I am going abroad now, and I am going to tell a lot of lies about you. By the time I come back, I want all of these lies to become true".

In that context, I might mention that I saw recently another quote about lies, which is perhaps more profound. It says: "It is very difficult to lie, if you do not know what the truth is". In that spirit, I propose that we first try to make sure that we know the truth about the Weizmann Institute, before we even consider telling any lies.

With your permission, I would now like to spend the rest of this talk, not in enumerating specific scientific achievements and discoveries of Professor X or Professor Y of the Weizmann Institute, but by clarifying what, in my mind, are the seven pillars on which the success of the Weizmann Institute is based. You may call these the seven pillars of wisdom, if you wish, following the book of Proverbs: "Wisdom has built her house, she has hewn out her seven pillars."

As a person who has spent a lifetime at the Institute, first as a student, then as a young scientist, as an older scientist, as the longest serving President and now as a former president, I have been exposed to all possible angles of the Institute. Every one of the principles I will now describe, the so-called Seven Pillars, was drilled into my head when I was twenty-something, without me being aware of it, and often while I refused to accept it and to believe it. After all, a good, energetic, thinking young man should always have doubts and should always challenge every idea. Decades passed before I understood how correct these principles are and until I realized that they are really in the blood, in the DNA, of the Weizmann Institute, and generation after generation is following them.

Pillar number one is the very long term thinking and vision of the Institute, not in terms of committees planning the future, but in terms of willingness to invest in the distant future, even at the expense of the present. This is manifested in many, many aspects, from the most important to the most minor. First and foremost, it is the entire concept of devoting all efforts to basic research and knowing that good basic research will eventually give beneficial commercial results and practical applications. It took a generation or two before this has been accomplished and the crown jewel of the money-makers of the Weizmann Institute, the Copaxone drug for Multiple Sclerosis, invented by Michael Sela and Ruth Arnon, who are both here with us, had to wait about 25 years from inception to real financial fruition.

The same attitude of looking ahead at the distant future led the Institute, in the 1950's to build a campus with beautiful gardens, in a country without water, without bread, without food, without money, without anything. One must have been crazy to build these gorgeous gardens with the idea of creating a pleasant and serene atmosphere for

science. But thanks to this long term thinking, every employee at the Weizmann Institute has arrived to work every morning, during the last sixty years, feeling as if he or she were coming to a Paradise. It is also thanks to this that some of the trees on campus are taller than the buildings.

Another example is the first computer. At a time when I, as a child, was allowed one hundred grams of beef and three eggs per week, a very difficult time in the beginning of the State of Israel in the early '50s, this crazy Weizmann Institute is building the second fastest computer in the world, with a budget which is mind-boggling for that period and with the purpose of doing basic research. But ten years later, the top computer experts in the country were trained at Weizmann, and five years after that, the first Ph.D. program in computer science was at Weizmann and later, after the United States introduced what is now the backbone of the internet, the Weizmann Institute brought it to Israel, which became the second country in the world using e-mail after the United States. The successful Israeli high tech computer-related industry owes much to this vision.

A completely different aspect of the long term vision is the purchase of land. In the most difficult times during the history of the Institute, if we had an opportunity to buy an extra piece of land next to the campus, we bought it. We followed this line, at all times, and now we have the fruits. We can always expand and we have enough land for the next hundred years. This is highly non-trivial.

What is common to all of the above examples, to investing in basic research, to the beautiful gardens, to the premature investment in a big computer and to the purchase of land, is forward thinking with a horizon of decades. Another component of the same attitude, of course, is the investment in young people, but we will get to this subject in a few minutes.

Pillar number two is interdisciplinarity. I mentioned all these marvelous other institutes, like Pasteur and Rockefeller and the various Max Planck Institutes, but we are the only one that has, on two sides of the street, twenty meters from each other, computer scientists looking at the brain and brain scientists thinking about computers. We have physicists and biologists, in different departments, collaborating with each other on many different subjects. We have bioinformatics activity, which is populated by biologists and by mathematicians, each providing input from their own field. You can add to the list many other topics, from Environmental Science to Structural Biology. Many normal universities have all of these fields, but in a very large campus, with thousands or tens of thousands of undergraduate students and relatively weak contacts among very different disciplines. But in a relatively compact Institute, dedicated only to basic research, our intense multidisciplinary is quite unique. Today, every other research institute is trying to get into this business. You see the Biology institutes branching into Physics and Bioinformatics, and vice versa. But we had it from the very beginning, long before others, and if you ask me why, I do not really know the answer. It was an amazing foresight, but it may have been motivated by megalomania, more than by some scientific logic of the 1940's.

Not only the entire Institute, but each of the first five departments at the Weizmann Institute, in 1949, was an interdisciplinary department. You would guess that, if someone wants to build a new institute with five departments, he or she might choose

topics like Mathematics, Physics, Chemistry, Biology. Not in the case of the 1949 Weizmann Institute. One department leader was Ephraim Katzir, creating a department of Biophysics, a combination of biology and physics. The second, Israel Dostrovsky, headed Isotope Research, namely applying techniques of radioactive isotopes to all sorts of scientific problems, from searching for underground water and minerals, all the way to medical applications. The third department, with Aharon Katzir as head, was Polymer Research, with an intense mix of Biology, Chemistry and Physics. The fourth department was Applied Mathematics, with Chaim Pekeris, solving physics problems with the help of computers and other advanced mathematical methods. And the fifth department was that of Isaac Bernblum, pursuing Cancer Research, utilizing methods from various fields of research.

This was a very unusual collection of fields to start a new institute in 1949, and none of these departments exists, as such, today. They have all been divided and merged and rearranged and reorganized, during the past sixty years, because science has changed. But the spirit of interdisciplinary approach has been engraved in everybody's mind. An important step forward was taken in the late 70's, when our sixth President, Michael Sela, introduced the concept of "Centers", which means mini-endowments, or internal small funding organizations, within the Institute, encouraging collaboration between different departments. At the beginning, this was a wise small step. But now, thirty years later, it is an excellent mechanism for doing things that many other places cannot do, and again, it is the long range vision, on one hand, and the multi or interdisciplinaryity on the other hand, which gave the right fruits.

Pillar number Three is change and flexibility. Long before President Obama made it popular, we were shouting "Change", and things have been changing all the time. In fact, sometimes you would look to the right, to the left, and back to the front, and the Institute is already different. Departments closed, departments opened, and the secret, which I have not seen anywhere else, is that we do not have any "slots". We do not say that we have five Chairs in Organic Chemistry and seven Chairs in Nuclear Physics and eleven Chairs in Computer Science. We have as many Chairs as we can think of, if we have good people, and we have zero Chairs if we do not find good people in a given field. That is how, at various periods of our history, certain fields completely disappeared, quite painlessly, unlike in most universities, where the great professor leaves, and the Chair remains and a mediocre person is installed. At the same time, with a record speed, we could allow entirely new fields to emerge on campus.

I participated, as a young scientist, in such a transition, when we created a strong and large Particle Physics activity instead of a flourishing empire of Nuclear Physics, which disappeared almost overnight. And then, as president, I experienced Particle Physics becoming smaller and giving way to other fields of physics and especially to what is now called Nano-Physics, and was then called "Sub-Micron Physics". This last field came out of nowhere with quite a number of new Professors, with an enormous financial investment and a very successful impact. Neurobiology was born in a similar way, Computer Science likewise, and many other scientific activities were created in this method.

The size of the Weizmann Institute was never determined by the board or by the management. It has always been determined by the number of excellent people that

we could find, and we never blocked a Professorial or a senior scientist appointment because we didn't have the money for it, even at times of deficits and financial crisis. This was not easy, but I can say with certainty that, never in the history of the Institute, we had a very good person that we wanted to hire and we refused to do it because we didn't have a slot, a Chair, a position or the funds, no matter how difficult the economy was at that time. The privilege of pursuing such a policy actually emanates from the restricted pool of candidates which is available to the Institute. Had we been able to recruit anyone in the entire world, we obviously could not behave in the same way. But given our limited pool of only Israelis and a small number of foreigners with special affinity to Israel, we could, and we still can, adhere to this policy.

Pillar number four: Aggressive pursuit of occasional applications. We are an Institute of basic research, not aiming at solving the practical problems of the world. We try to understand nature, discovering its laws, studying the beginning of the universe, deciphering the origin of life, uncovering the properties of living organisms and of sophisticated materials, and numerous other secrets of nature. We are driven by curiosity, not by profit, but with a full knowledge of the fact that, when we pursue basic research at a high level, we are going to discover useful things. We were brought up at the Institute, and we continue to educate our younger generation, that to discover useful things is something to be proud of, not to be ashamed of, as some purists might think. And if you discover something useful and you are proud of it, you go all the way to exploit it and, if necessary, you fight against half of the world in order to gain some financial benefits from it, so that you can invest the income again in your basic research.

This was preached into me until my mind was blown when I was twenty-something. I always asked: This basic research, what is it good for? The above answer was always given, and I did not believe it. I said: "That is the story that these scientists are telling me, because they are actually paid to do what they like to do, and they have to give a reason for it, so they say that it's going to be useful when you do good work!" But when now the Weizmann Institute leads the entire academic scientific world with income from intellectual property, well, perhaps this is a correct formula, after all. Perhaps this was not just a story that the scientists were telling a young person forty years ago, just because they like to do what they are doing. Perhaps it is true that all of these things happen not because we wanted to make money, but because we wanted to solve real scientific problems, and we succeeded!

This attitude actually started with Chaim Weizmann, who, in some sense, got the Balfour declaration by doing scientific research that proved useful. It continued with the founding of Yeda, our intellectual property company, fifty years ago, long before the rest of the world was seriously considering making profits on the basis of intellectual property derived from basic research. The 50th anniversary of Yeda is this year. The next step was the first commercial production plant on the campus of the Weizmann Institute, based on the invention, by Israel Dostrovsky, of a method of producing heavy water enriched with heavy Oxygen (not the kind of heavy water used in nuclear reactors). For several decades, until about 1990, this little plant was the leading producer in the world of this niche product, which is used for medical purposes.

An important step, in the late 1960's, was the establishment of the Kiryat Weizmann industrial park on the Institute's land, north of the campus. This was one of the first industrial parks in the world outside of the United States. At that time, even in the United States, there was only route 128 near MIT and the beginning of what is now called Silicon Valley near Stanford, and we have already started this park which is now bigger than the Institute and flourishing with companies. Some of these companies have nothing to do with us and some are 100% based on our work.

We are also doing something else for the future. We pour most of the substantial funds that we earn from our intellectual property, into our endowment. We do not spend it as it comes, dedicating it to guarantee the economic future of the Institute. If you wish, this is a mix of Pillar number four and the first Pillar of a long term vision and foresight.

I might also mention here a related item regarding the interface between basic research and advanced technology. We do not have a department of Engineering, but we have a lot of engineering research on campus. We do not have a Medical department and we do not have a department of Agriculture. All of these fields, which are derived from basic research and contribute to our research, are integrated into the relevant fields of science. What is done elsewhere in Electrical Engineering, is part of Physics at the Weizmann Institute; what is normally done with computer development is part of Mathematics and what is normally done in Medicine is part of Biology and Biochemistry. We believe in a complete integration of science and technology on campus and we are not going to open an Engineering school or a Medical school, at least not in the foreseeable future, because we incorporate these topics within the sciences which encompass them.

Pillar number five: Large and daring projects. We are the only research institution in Israel that had the courage and the governance structure to embark on very large scientific projects. Not just absorbing one scientist at a time, with his or her laboratory. It started with the WEIZAC, the legendary computer in the '50s. It continued with a sequence of Physics accelerators, culminating in the '70s with the Koffler tower, which is now, 35 years later, completely obsolete, but it served its mission, and no one else on the Israeli academic horizon could do it. It continued with the solar energy project and then with the sub-micron or nano-physics project, which, by our standards, cost an incredible fortune and put us on the world map in that field in a very prominent way. It proceeded with the recent outstanding pre-clinical facility, and, in between, with the development of neurobiology on a very large scale, starting with the creation of the department at the time of Michael Sela and then the enormous expansion later, in the late '80s, in the early '90s, and until now.

Pillar number six: Emphasis on the young generation of scientists. We insisted on having our own Graduate School, not agreeing to remain a research institute that has to rely on a graduate school of someone else. We pay every single student quite a generous fellowship, and we make sure that their life at the institute, as students, is very good. We teach in English so that we can have an international atmosphere and accept many foreign students from all over the world, including India, China, America and Europe. There are prominent scientists in several countries, who were students or post-doctoral fellows at the Weizmann Institute. We always knew how to allow young scientists, who matured, to spread their own wings and not remain under

the older professor who might otherwise remain their eternal mentor. We never accepted the phenomenon of sixty-year-old scientists, having a sixty-five year old Professor, who is telling them what to do. Europe is full of negative examples of such a situation and we always avoided it.

Here, I might mention one person as an example of both sides of the coin: Michael Sela. He is the only one of our early leaders who was the student of another great leader, Ephraim Katzir, but Michael spread his own wings in a beautiful way soon after, and he raised generation after generation of his own students. They all flourished and became totally independent, and this is just one example among many.

I grew up under the wings of Amos De Shalit, the greatest mentor that we had in physics. I did not learn much physics from him, because he was in a completely different field, but I learned from him almost everything else: How to deal with the younger generation, how to move into new fields of research, how to deal with science policy and management, how to think about the distant future and why it is important to contribute to education. He was teaching me all of these things when I was under the age of twenty five, with a conviction that the leadership of tomorrow must be trained at a very young age.

Pillar number seven, the last one, but definitely not the least, is Science Education for school age children and for the general public. For the last 45 years we have done something that no other research institute in the world has done with such an intensity and magnitude. We have an enormous collection of operations, contributing to science education in the school system in Israel and to the scientific enlightenment of the general public: Science Education for children with outstanding talents, for kids who love science, for kids at the low echelons of society, for school dropouts, for entire school classes, enhancing teacher training, developing new science curricula, and finally, the crown jewel, the tutoring and mentoring project, Perach.

We have founded Perach 35 years ago and the project has been operating since then in all Israeli universities, currently with 25,000 university undergraduates acting as mentors or "big brothers and sisters" to an equal number of children from low socio-economic background. The student mentors receive a tuition fellowship in return for this activity and this is the largest project of its kind in the world, initiated by, and managed by, the Weizmann Institute, for over three decades. It has already touched the lives of over one million Israelis!

The latest major development in the educational saga of our Institute is the establishment, almost ten years ago, of the Davidson Institute of Science Education, which is now encompassing all of these programs, for the gifted, the interested, the dropouts, the adults, the teachers, in school, out of school, during the summer, during school vacations, in afternoons, in our outdoor science museum, in our own campus and all around the country.

Our educational activity is an important contribution to the State of Israel, and it is necessary for several reasons. It is a bit selfish, because it helps to raise our own next generation of scientific leaders; It helps advance the image of science in the country; It contributes to the well-being of the entire population in an era in which science and technology are the dominant features of the economy; and it contributes indirectly to

the economy, to industry, to defense, to health, to the environment and to numerous other fields.

So these were the Seven Pillars: The long term thinking and vision; Interdisciplinarity; Change and flexibility; Aggressive pursuit of applications; Big and daring projects; Advancing young scientists; Emphasis on Science Education.

All of this was done by outstanding people: An incredible collection of great people, too many to mention. But, at the risk of making hundreds of enemies, I will mention nine prominent names:

Chaim Weizmann, the founder, who was the first President of the Institute. In those days it was not such a difficult job, so he also had a side-job as the first President of the State of Israel.

Meyer Weisgal, the one and only entrepreneur, who really made the Institute what it is, with his incredible personality. I was probably asked to give this talk today because I am the youngest of the old generation and the oldest of the young generation. I believe that I am the youngest person who still knew Weisgal very well, and I wish to share with you three short stories about my meetings with Weisgal: My first ever, my first as a scientist and my last, and each one of them was remarkable.

The first one was in 1958, the tenth anniversary of the State of Israel. My late father, who was a Member of Parliament, was appointed to be the chairman of the national committee for the celebration of the tenth anniversary and under him the real impresario was Meyer Weisgal. He came to visit my father in our apartment in Tel Aviv. I was seventeen. He rang the doorbell and I opened the door. In walks Weisgal, looking a bit like Ben Gurion, barely says hello, pushes me to the side, and barks: "Where is your father"? I said: "my father will be with you in a minute". He runs to the living room, sees a telephone, picks it up and calls the United States. Now, you have to remember what it meant in 1958 to call the United States. If he would grab a diamond from the table and run out with it, it would be less expensive for us, not that we owned diamonds. I look at him and he is shouting and yelling at somebody across the ocean, behaving as he owns the place. That was the first meeting.

Second meeting: Fall of 1967. I become the youngest Professor at the Weizmann Institute. Weisgal hears about this young hotshot, and says: "bring him to me". I come to his office. He gives me a look, and he says: "Young man, do you speak Yiddish?" I said: "No." He says: "So, you are not a Jew." Obviously, being a fifth generation Israeli born, I did not speak Yiddish. So, I look at him with the Chutzpah of a 26-year old and I say: "Mr. President, do you speak Hebrew?" He answers: "No." I say: "So, you are not a Jew". From that moment he really loved me. Those who remember him will know that nothing made him love you more than such Chutzpah.

And our last meeting was also remarkable. He never spoke Hebrew. He seemed to have known a few Hebrew words here and there, but rarely used them and always spoke English or Yiddish. He was already very sick with terminal cancer, a few weeks before he died, and I often visited him. By then I was Dean of the Graduate School. I was sitting next to him, he could not speak loud, and he was under the influence of strong medication. Without me saying anything, he started a conversation in Hebrew,

not in English as we always spoke. His Hebrew was surprisingly good, and I said: "Meyer, why didn't you speak Hebrew to me all those years?" He said with the sadness of a dying old man: "well, for me, words are so important. In English and Yiddish I feel so comfortable and Hebrew – I can go shopping in Hebrew, but that's all". It was so moving. For the first and last time we conversed in Hebrew and his Hebrew was unbelievably good. I was totally surprised. So that was Weisgal, a very special person.

Then there were the first five founders of the first five departments in 1949, each a giant in his own right. I already mentioned all of them: *Isaac Bernblum, Israel Dostrovsky, Ephraim Katzir, Aharon Katzir and Chaim Pekeris*. Each one contributed in many other ways to many other things. Each one was the first in Israel to do whatever he did and many of them made major contributions outside the Institute. Ephraim was the fourth President of the State of Israel. Israel Dostrovsky was the most important illustrious Director General of the Israel Atomic Energy Commission and the fifth President of the Weizmann Institute. Aharon Katzir was murdered by Palestinian-sponsored Japanese terrorists in Ben Gurion airport. All of them are or were incredible people.

The last two that I will mention in this list of nine are from the next generation. One I already mentioned several times: *Michael Sela*, who is here with us today, and is perhaps the leading scientist of the next generation, the one who gave us both the practical inventions and the basic science, and was the sixth President of the Institute.

And the last one is *Amos De Shalit*, who died at the age of 43, and managed at this very young age to create a significant number of building blocks of the Institute, including some of the seven pillars, and who, until this very day, serves as a role model to many of us.

These are the nine names that I chose to mention, but there were also thousands of others, and I would like particularly to mention the plumbers and the electricians and the technicians and all the different people in the administration and the secretaries and the gardeners and all of the employees who consider the Institute their home and who know that this is their family. They come to work, every day, with a feeling that, upon entering the campus, they are crossing a boundary into a better world. It took me many years to learn to appreciate them even more than I appreciate the scientists. The scientists care deeply about the Institute, but they also care about their own work and about themselves, and these people care almost entirely about the Institute. They proved it more than once in difficult periods.

It is this exquisite human embroidery, a unique collection of people, contributors on campus and supporters all around the world, with famous heroes and unknown soldiers, which led to the success story of the Weizmann Institute. I leave it to our tenth president, *Daniel Zajfman*, to tell us in tomorrow's session, what he plans for the next 60 years. Thank you very much.