A black and white portrait of Lise Meitner, an elderly woman with short, wavy hair, wearing a dark suit jacket over a light-colored blouse and a patterned tie. She is looking directly at the camera with a serious expression. The background is a simple, slightly blurred indoor setting.

A Tribute to the Memory of
(Elise) Lise Meitner

(1878–1968)

By Professor em. Anders Bárány

Royal Swedish Academy of Engineering Sciences (IVA)

A Tribute to the Memory of

(Elise) Lise Meitner

(1878–1968)

Presented at the 2020 Annual Meeting of the
Royal Swedish Academy of Engineering Sciences

By Professor em. Anders Bárány

Contents

Foreword	6
Tage Erlander has a visitor	8
Who was Lise Meitner?	9
Lise Meitner looks back	11
Early days in Vienna	12
Education under difficulties	13
Planck and his students	14
A famous group	17
The new basis of physics	18
Bohr without bigwigs	18
Lise Meitner, nuclear power and Kungälv	23
Lise Meitner and KVA	27
Voices about Lise Meitner's time in Sweden	29
Concluding comments	36
Literature	39

Foreword

Each year the Royal Swedish Academy of Engineering Sciences (IVA) produces a booklet commemorating a person whose scientific, engineering, economic or industrial achievements were of significant benefit to the society of his or her days. The person to be recognized in the booklet must have been born at least 100 years ago. The commemorative booklet is published in conjunction with the Academy's Annual Meeting.

This year we acknowledge Lise Meitner, who gave the theoretical explanation of fission. She launched the revolutionizing idea that when uranium is bombarded with neutrons nuclear fission occurs releasing large amounts of energy. Her theory was the foundation for the construction of nuclear reactors, utilized for nuclear power energy supply as well as for research and development of neutron scattering, a method which will be applied for materials science in ESS and other excellent research. Lise Meitner was distinct about possibilities and risks of new scientific findings and she is thus a role model for young researchers.

We wish to extend our sincere thanks to Professor Emeritus Anders B ar any for the time and effort he has dedicated to this year's commemorative booklet.



Tuula Teeri
President of the Academy



Camilla Mod er
Chairperson of the Medals Committee



Lise Meitner in her simple laboratory at the Nobel Institute in 1940.

Tage Erlander has a visitor

On 29 October 1945 the Minister for Ecclesiastical Affairs (Minister of Education) Tage Erlander is visited by a female scientist. She is described in the first volume of Tage Erlander's diaries in this way (by Leif Andersson, who designed the comprehensive index):

Meitner, Lise, professor, prominent Austrian nuclear physicist, discoverer of fission (atom splitting), active in Sweden 1938–60, elected member of the Academy of Sciences 45.

8

The reason for the visit is that, after the atomic bombs were dropped on Hiroshima and Nagasaki, Erlander wants to discuss possible Swedish investments in nuclear physics/nuclear technology. The diary entry reads as follows:

Lise Meitner called on me at the invitation of Malte Jacobsson. She apparently wanted a research institution in Stockholm in contact with Klein, but had some reservations about the appropriateness of locating it in Lund. According to her, Siegbahn was a great scientist and device designer, but not an atomic scientist.

Malte Jacobsson is a political party colleague of Erlander and knows Lise Meitner through his first wife, who is a good friend of hers.

Oskar Klein and Manne Siegbahn are both professors in Stockholm – Klein in mechanics and mathematical physics at the University College and Siegbahn, who received the 1924 Nobel Prize in Physics, is head of the Academy of Sciences' Nobel Institute for Physics. This is where Lise Meitner worked during the war years.

That Erlander, whose main focus has been on social policy and who only has served as Minister for Ecclesiastical Affairs since 31 July 1945 (and becomes Prime Minister by 11 October 1946), now has research policy on his agenda this particular year may seem like a strike of destiny. While a student, he has namely become a close friend of physicist Torsten Gustafsson, later a professor of mechanics and mathematical physics at Lund University. Gustafsson in turn is a good friend of the Danish Nobel Laureate in Physics Niels Bohr, a key figure in atomic/nuclear physics. Eventually Gustafsson also becomes an advisor to Erlander in matters relating to atomic energy (nuclear power).

Who was Lise Meitner?

The first answer to this question comes from Svenskt Biografiskt Lexikon (Dictionary of Swedish National Biography) and was compiled by editor and history senior lecturer Göran Nilzén (1985–87). This is an abbreviated version, a CV (see box):

Meitner, Elise (Lise), born 7 Nov. 1878 in Vienna, Israelitische Kultusgemeinde, died 27 Oct. 1968 in Cambridgeshire, Great Britain. Parents: Philipp M Skovran, lawyer and Doctor of Laws, and Hedwig Skovran. Graduated from school Vienna 01, enrolled in univ. there 01, doctoral degree in maths and physics there 05, conf. PhD there 06, continued studies in physics at univ. in Berlin 07, assistant to physics prof. Max Planck there 12–15, roentgenologist at war hospital in Austria 15–17, led establishment of a physics dept. at Kaiser Wilhelm Institut für Chemie in Berlin-Dahlem autumn 17, director there 17–38, sen. lect. in physics at univ. in Berlin 22, prof. of physics there 26–38, worked as nuclear physicist at the Nobel Institute (with Prof Manne Siegbahn) 1 Sept 38–46, personal position in nuclear physics at StH (while working at KTH) 22 Nov. 46 (started 1 Jan 47)–60, Swedish citizen 18 Nov. 49, residing in Cambridge from 60. – LVVS 41, LVA 45, honorary doctorate at StH 30 May 50. – Marital status, single.

The abbreviations StH, KTH, LVVS and LVA stand for “Stockholm University College”, “Royal Institute of Technology”, “Member of the Royal Society of Arts and Sciences in Gothenburg” and “Member of the Royal Swedish Academy of Sciences (KVA)”, respectively.

In a far longer text, which has been significantly shortened here, we allow Lise Meitner herself to describe her life up to 1945. Listen to her voice when she, at the age of 84 on 20 September 1963, describes her life in a lecture at the International Atomic Energy Agency (IAEA) in Vienna. Here we present parts of the lecture, which in its completeness made up

an internal report at AB Atomenergi. The report is a gift to Anders Barany from Professor Inga Fischer-Hjalmars. It was discovered when she was cleaning out a filing cabinet. The text was also published in 1964, but at that time with the linguistic modifications of an editor.

At the time of the lecture, Lise Meitner's good friend, the Swede Sigvard Eklund, was Director General of the IAEA.

Lise Meitner looks back

I believe all young people try to think about how they would like their lives to develop; when I did so during my youth the conclusion I always arrived at was that life need not be easy provided only it was not empty. And this wish I have been granted. That life has not always been easy – the First and Second World Wars and their consequences have seen to that – while for the fact that it has indeed been full, I have to thank the wonderful development of physics during my lifetime and the great and lovable personalities with whom my work in physics has brought me in contact.

Although I had a very marked bent for mathematics and physics from my early years on, I did not take up a life of study immediately. This was partly due to the ideas which were then generally held with regard to women's education and partly to the special circumstances in my native city, Vienna. So I lost several years, and, in order to catch up, I was coached privately for the leaving certificate (Matura) along with two other girl

students and sat the exam at a boy's school, the Akademisches Gymnasium in Vienna, which was not altogether easy. We were 14 girls in all and four of us got through.

Early days in Vienna

In 1901 the chair of theoretical physics was vacant, as Boltzmann¹ had left Vienna again, this time for Leipzig. He had already gone away once to spend three years in Munich but had then returned; so the Austrian Government, in the hope that he would return this time too – as in fact he did in 1902 – left the chair vacant. This meant, however, that I was able to hear his lectures from 1902 until his death in 1906.

The Institute for Theoretical Physics was at that time in a very primitive, converted apartment house in Türkenstrasse 3, a lecture room with benches rising steeply behind each other and an entrance which really looked like the entrance to a hen house, so that I often thought, “If a fire breaks out here very few of us will get out alive”. The internal fittings of his lecture room, however, were, relatively speaking, very modern. There were three large blackboards and Boltzmann wrote up the main calculations on the middle board and the subsidiary calculations on the boards either side, so that it would almost have been possible to reconstruct the entire lecture from what was written on these three blackboards.

¹ Professor Ludwig Boltzmann developed statistical mechanics, the basis of thermodynamics.

Education under difficulties

At the time of which I speak, women's education was just beginning to develop in Vienna, and indeed in Austria, but I knew very little of this development and must confess I could not say, even today, whether my university teachers were in favour of women's education or not. All I can say is that I was very uneasy in my mind as to whether I could be able to become a scientist; so I also took my teaching diploma and did my year's trial at a girls' high school, in order to keep these possibilities open. At the same time I did try to carry my scientific education a stage further. I had a place in Professor Boltzmann's institute, where Stefan Meyer took over temporarily after Boltzmann's death. In this way, through Stefan Meyer,² I got to know the new field of radioactivity, although I certainly never had any intention of specializing in it. Initially my thoughts ran in the direction of more general physics.

When I registered with Planck³ at the University in Berlin, so as to be able to hear his lectures, he received me very kindly and very soon afterwards invited me to his home. But the first time I visited him there, he said to me: "But you are a Doctor already! What more do you want?" And when I replied that I would like to gain some real understanding of physics he just said a few friendly words and did not pursue the matter or enter into it any further. Natu-

² Stefan Meyer was instrumental in the establishment of the Institute for Radium Research in Vienna and became its director in 1920.

³ Max Planck, theoretical physicist, received the 1918 Nobel Prize in Physics for his discovery of energy quanta.

rally I concluded that he could have no very high opinion of women students, and possibly that was true enough at the time. He did, however, make me his assistant five years later and this not only gave me so to speak a springboard which made it possible for me to really develop my scientific faculties, but also contributed greatly to my development as a person.

Planck and his students

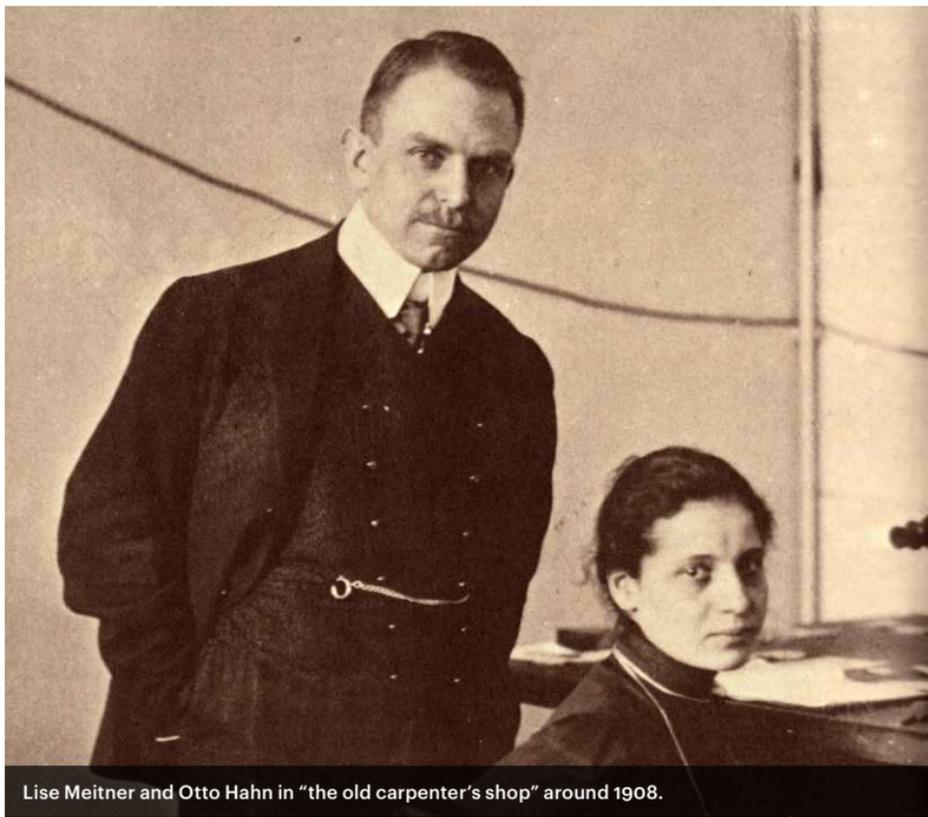
In addition to attending Planck's lectures on theory I did want to do some experimental work and for this purpose approached Professor Rubens, who was at that time head of the Department of Experimental Physics in Berlin. But he told me the only space he had would be in his own private laboratory, where I could work under his direction, in other words, to a certain extent with him.

Now it was quite clear to me then as a beginner how important it would be for me to be able to ask about anything I did not understand, and it was no less clear to me that I should not have the courage to ask Professor Rubens. While I was still considering how I could answer without giving offence, Rubens added that Dr. Otto Hahn had indicated that he would be interested in collaborating with me, and Hahn himself came in a few minutes later. Hahn was of the same age as myself and very informal in manner and I had the feeling I would have no hesitation in asking him all I needed to know. Moreover, he had at that time a very good reputation in matters of radioactivity, so I was convinced that he could

teach me a great deal. The only difficulty was that Hahn told me in the course of our conversation that he had been given a place in the institute directed by Emil Fischer,⁴ and that Emil Fischer did not allow any woman students into his lectures or into his institute. So Hahn had to ask Fischer whether he would agree to our starting work together.

He finally agreed to my working with Hahn if I promised not to go into the chemistry department where the male students worked and where Hahn conducted his chemical experiments. Our work was to be confined to the so-called carpenter's shop. This was a small room originally planned as a carpenter's workshop; Hahn had fitted it out as a room for measurements and he worked there on radiation. For the first few years I was therefore naturally restricted to this work and could not learn any radiochemistry. But as soon as women's education was officially regulated in Germany, i.e. in 1909, Fischer at once gave me permission to enter the chemistry department and I must say that in later years he was most kind in supporting me in every respect and I have him to thank for the fact that in 1917 I was given responsibility for setting up a department of radiation physics in the Kaiser Wilhelm Institute of Chemistry. Although it naturally took some time for matters to proceed this far, this is not to say that I was in any sense isolated. Admittedly the assistants in the Chemistry Institute had no particular love for women students and it sometimes happened that if Hahn and I were walking together on the street and one of the assistants met us he said somewhat obviously, "Good day Herr Hahn".

⁴ Emil Fischer received the 1902 Nobel Prize in Chemistry for his work on sugar and purine syntheses.



Lise Meitner and Otto Hahn in "the old carpenter's shop" around 1908.

A famous group

With the physicists, however, I found from the start a very friendly disposition and also friendly understanding. I got to know Laue⁵ as a result of Planck's lectures and he was really a very good friend right up to the time of his premature death. The other young physicists I got to know mainly at the Wednesday colloquia, which later became so famous. These were first led by Rubens and later by Laue. Originally it was a very small group of at most 30 people who came – the professors, of course, such as Planck, Nernst⁶ and later Einstein.

Even in 1907 these colloquia were already a quite exceptional intellectual centre. All the new results which were then pouring out were presented and discussed there.

I cannot tell for certain when I became acquainted with the model of the atomic nucleus developed by Rutherford in 1911, but I met Rutherford for the first time in 1908 when, on the way back from receiving the Nobel Prize for chemistry in Stockholm, he visited Berlin to see his pupil Hahn and, when he saw me, said in great astonishment: "Oh, I thought you were a man". He had not realized that my first name is a girl's name.

⁵ Max von Laue discovered the diffraction of X-rays in crystals and received the 1914 Nobel Prize in Physics.

⁶ Walter Nernst developed thermodynamics and received the 1920 Nobel Prize in Chemistry.

The new basis of physics

In 1913, Hahn and I moved from the carpenter's shop to the Kaiser Wilhelm Institute for Chemistry, which had been founded in 1912 as the first of the Kaiser Wilhelm Institutes. Here, Hahn was given a small section; at that time I was Planck's assistant and was at first invited into the Institute as guest, although later I obtained a post there too.

In 1917, I had been given the task of establishing a department of radioactive physics [at the KWI for Chemistry].

As a result of this division of the Institute into two, Hahn and I no longer worked together from about 1920.

Bohr without bigwigs

I first met Bohr in 1920 when he was lecturing to the Physics Society in Berlin. In his lecture he stressed the importance of series of spectral lines and for their interpretation for the first time introduced his correspondence principle. I must confess that when James Franck, Gustav Hertz⁷ and I came out of the lecture we were somewhat depressed because we had the feeling that we had understood very little. In this half-depressed and half-playful spirit we

⁷ Franck and Hertz received the 1925 Nobel Prize in Physics for the study of electrons colliding with atoms.



The meeting with Bohr without bigwigs attracted the attention of graphic novel author Jim Ottaviani in both 1999 and 2004. This image is from the latter publication.

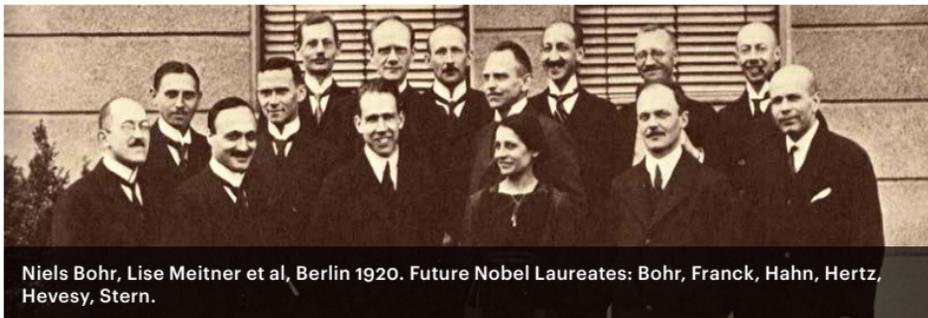
decided to invite Bohr to spend a day at Dahlem (where the Kaiser Wilhelm Institutes were located), but not to include in the party any physicists who were already professors.

That meant that I had to go to Planck and explain to him that we wanted to invite Bohr, who lived with Planck, but not Planck himself. In the same way, Franck had to go to Professor Haber⁸ – because after all, if we were going to have Bohr in Dahlem for the whole day,

⁸ Fritz Haber discovered a method for nitrogen fixation from the atmosphere and received the 1918 Nobel Prize in Chemistry.

we wanted to give him something to eat – and ask Haber for the use of his clubhouse for our discussion “without bigwigs” (bonzenfrei), again stressing that we did not want to invite Haber himself, as he was already a professor. Haber was not the least put out. Instead he invited us all to his villa – this, you must remember, was the very difficult period after Germany had lost the War, and to get something to eat was rather difficult in Dahlem. Haber only asked for our permission to invite Einstein to lunch as well. So we spent several hours firing questions at Bohr, who was always full of generous good humour, and at lunch Haber tried to explain to Bohr the meaning of the word “Bonze” (bigwig).

If I may revert for a moment to Dahlem, I must say that the years up to 1933 were very stimulating. We needed, and we developed, complicated apparatus in both departments and we were surrounded by a crowd of young people, students and staff, who did not only learn from us, but from whom we could learn a great deal too, as regards human relations and sometimes also as regards our work. There was really a very strong feeling of solidarity between us, built on mutual trust, and this made it possible for the work to continue quite undisturbed even after 1933, although the staff was not entirely united in its political views. They were however all united in the desire not to let our personal and professional solidarity be disrupted and I must say that this was really a special feature of our circle and I continued to experience it as such right up to the time I left Germany because it was something really quite exceptional in the political conditions of that day. In this way Hahn and I were able from 1934 to 1938 to resume our joint work, the impetus for which had come from the results obtained by Fermi in bombarding heavy elements



Niels Bohr, Lise Meitner et al, Berlin 1920. Future Nobel Laureates: Bohr, Franck, Hahn, Hertz, Hevesy, Stern.

with neutrons. As you know, this work finally led Otto Hahn and Fritz Strassmann to the discovery of uranium fission. The first interpretation of this discovery came from Otto Robert Frisch and myself, and Frisch immediately demonstrated the great release of energy which followed from this interpretation.

But by then I was already in Stockholm. There too I was able to watch many interesting new developments in the field of physics. It was mainly Oskar Klein, Professor of Theoretical Physics in Stockholm, who in his friendly way helped me understand these things, for instance the discovery of mesons and hyperons; while for the fact that the inner structure of a reactor has not remained entirely a closed book to me, I have to thank Dr. Sigvard Eklund, who has always been a very good and helpful friend to me in questions of physics and in other questions as well. Finally, I ought to mention Professor Borelius,



Lise Meitner and Sigvard Eklund (on the right) with AB Atomenergi's Executive Director Harry Brynielsson around 1955. Eklund was, among other things, project manager for the construction of the first Swedish nuclear reactor R1 at KTH.

whose work has gained greatly in importance, owing to the attention now devoted to semiconductors – a field in which he did much preliminary work. When he opened his new institute he placed a few rooms at my disposal in which I was able to set up a small department of nuclear physics, of which I remained in charge till my retirement. In this way I can say that in Sweden too, physics has brought light and fullness into my life.

Lise Meitner, nuclear power and Kungälv

Finally, some sections of a lecture given by Sigvard Eklund on 13 April 1989 in Kungälv in connection with the placement of a plaque commemorating the solution to the problem of splitting the atom. The English text, which was included together with a German text in 2006 reads:

The Austrian nuclear physicist LISE MEITNER stayed here, then a hotel, at Christmas 1938, as a refugee from Nazi Germany, with her nephew, the physicist Otto Robert Frisch. Together they discussed the problem of nuclear fission as posed to them by Otto Hahn, her former colleague. In Kungälv they gave a decisive explanation of the phenomenon. Later Otto Hahn was awarded the Nobel Prize in chemistry. Despite being nominated for the physics prize several times, Lise Meitner's work was not recognised until 1997, thirty years after her death, by having the element Meitnerium named after her."

Lise Meitner spent Christmas 1938 in Kungälv, north of Gothenburg, at the home of Eva von Bahr-Bergius. Otto Robert Frisch usually celebrated Christmas with Lise Meitner in Berlin, and it was agreed that the Christmas tradition should continue even if the location had to be Kungälv this time.

When Frisch and Meitner met on the morning after Frisch's first night in Kungälv, he was eager to talk about his work in Bohr's institute and Meitner was keen to discuss a letter dated

19 December, which she had just received from Hahn, in which he described the analysis he and Strassmann had conducted. The analysis could only be interpreted as showing that, among other elements, barium had been formed from neutron irradiation of uranium.

Meitner and Frisch sat down on a tree trunk to make a calculation of the energy balance in a process where a uranium atom is split into two parts of about the same size. It was clear to them that the process was both possible and that it must result in the release of energy of around 200 MeV or about 50 million times more than combustion of a carbon atom.

On 1 January 1939 Lise Meitner writes in a letter to Hahn in Berlin: “We have read and reflected about your result, and it is perhaps possible from a purely energy perspective that an atom as heavy as uranium can be split”.

The immediate dissemination of the Hahn-Meitner-Strassmann-Frisch conclusions led to the starting of research in the field in many laboratories provided with the right equipment.

Meitner's entire family fled Austria. Her older sister Gusti with husband Justinus Frisch, Otto Robert's parents, moved to Sweden to live with Lise in a flat that she had managed to rent. Eventually Lise's belongings from Berlin were sent there as well.

She moved from Siegbahn's department to the physics department at the Royal Institute of Technology, where Professor Gudmund Borelius gave her rooms to use. Later she moved to IVA's research institute where AB Atomenergi had new premises in conjunction with the construction of Sweden's first nuclear reactor. In 1949 she became a Swedish citizen and her financial situation improved. She remained in Sweden until 1959 when she moved to Cambridge, England, to be close to Frisch, his parents and other relatives who lived there.

At the age of 81 Lise was still hale and hearty – both physically and intellectually – and still enjoyed hiking in the mountains of Austria or giving lectures in different countries. She passed away just before her 90th birthday in 1968 as the last surviving child among Philipp and Hedwig Meitner's eight children.

Lise Meitner published about 150 scientific articles during her lifetime. We can only imagine today the difficulties she had to overcome as a female scientist in a time and in a country where there were few advocates of the emancipation of women and from which she was later forced to flee.

During her long life she received confirmation on many occasions of the scientific world's recognition of her work. The 1944 Nobel Prize in Chemistry was awarded in 1945 to Otto Hahn "for his discovery of the fission of heavy nuclei". Lise Meitner never complained in conversations with friends or in any of her private correspondence about the fact that the Nobel Prize was awarded to Hahn alone. In 1966 Hahn, Meitner and Strassman shared the American Enrico Fermi Award. This was the first time it was awarded to a non-American and the first time a woman had received it. For many it felt particularly gratifying that all these three scientists who had worked together for many years and contributed to the "discovery of the fission of heavy nuclei" had finally been jointly rewarded.

Meitner was not only richly equipped intellectually. She had many interests besides science, she was warm and humane and she was an excellent storyteller. In Sweden she became a source of inspiration for many younger physicists who felt drawn to the field of nuclear physics.



SOCIO MERITISSIMO REGIA ACADEMIA SCIENTIARUM SUEC MCMLXXCIX

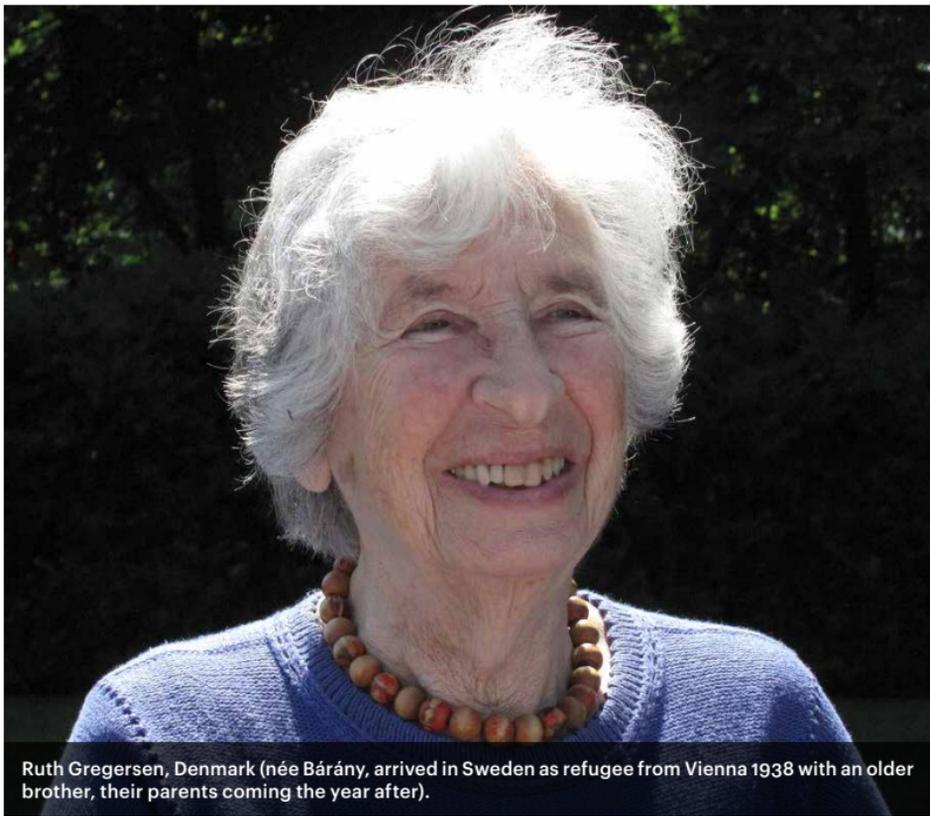
NAT. MDCCCLXXVIII
LISE MEITNER
OB. MCMLXXVIII

Lise Meitner and KVA

In August 1945 atomic bombs are dropped on Hiroshima and Nagasaki. Lise Meitner instantly becomes world famous and is named “the mother of the atomic bomb”, something she did not appreciate at all. (After the death of Einstein in 1955, when she is invited to contribute to a commemorative publication, she writes “Neither Professor Otto Hahn nor I had anything to do with the development of the atomic bomb”.) But her position within KVA rises and on 24 October 1945 she is the third woman to be elected as foreign member of the Academy. The first was a Russian Princess, elected in 1783; the second was Marie Sklodowska Curie, elected in 1910 in the chemistry “class”. The class that Lise Meitner is elected into was called the class of physics and meteorology and had 10 foreign members. The six physicists were all Nobel Laureates: Lenard, Planck, Einstein, Bohr, Richardson and de Broglie. Good company for Lise Meitner!

Meitner moves over to KTH and becomes a Swedish citizen in 1948. In 1951, KVA transfers her to a Swedish membership and she then becomes the Academy’s second Swedish female member. The first was Eva Ekeblad née De la Gardie, elected in 1748!

In 1999 KVA strikes a medal to commemorate Lise Meitner. On it are the words “FISSIONEM NUCLEAREM ILLUSTRAVIT” which translates to “explained nuclear fission”.



Ruth Gregersen, Denmark (née Bárány, arrived in Sweden as refugee from Vienna 1938 with an older brother, their parents coming the year after).

Voices about Lise Meitner's time in Sweden

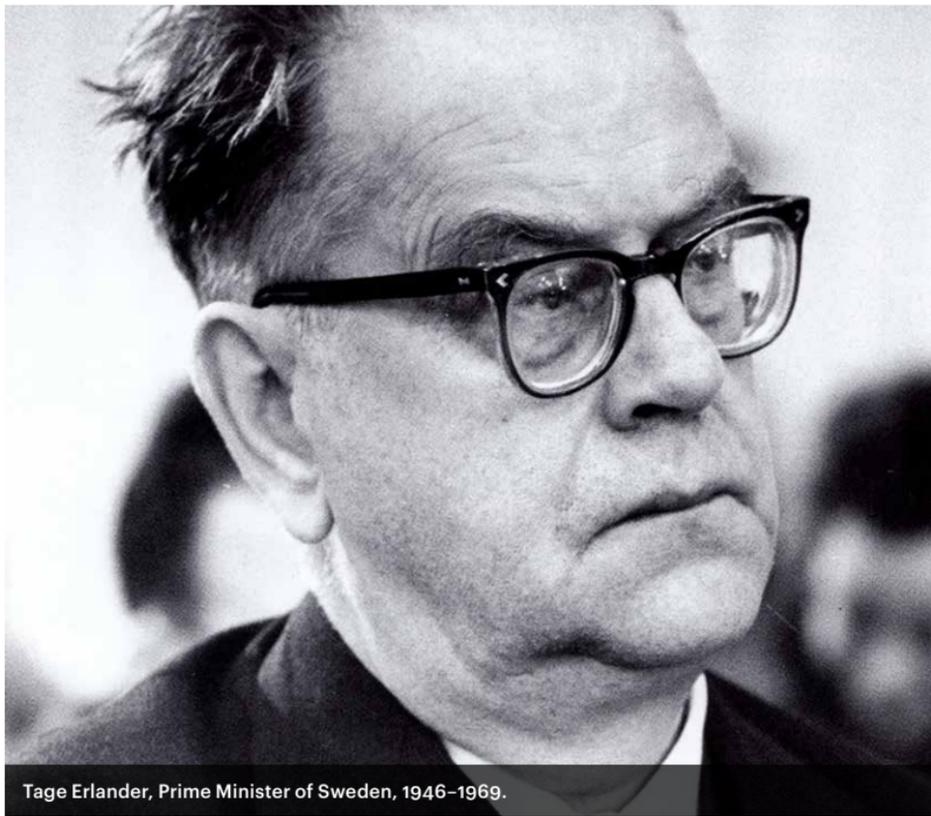
There is a lot more to say about Lise Meitner and many substantial volumes have been published based on her extensive correspondence. Unfortunately, a number of scientific squabbles occurred around these volumes, mainly due to the fact that the various interpretations of her letters do not provide a definitive picture of Lise Meitner. Let us therefore listen to some voices of persons that actually knew Lise Meitner as they reflect on her time in Sweden.

Ruth Gregersen (text 2003)

One day my mother was sitting on a bench in Humlegården and by coincidence Gusti Frisch, Otto Robert's mother, sat down beside her. They began to talk and it turned out that they had several mutual friends. Through Gusti and Juz (her husband) my parents became acquainted with Lise Meitner. She often visited us at Brålund during the war years.

When she visited us she was often frustrated over the limited opportunities for research at Siegbahn's department. She was worried about Hahn and her other friends in Germany whom she helped as much as she could. She was very preoccupied with politics – her visits always included lively political discussions. She was also very interested in her fellow-beings and was warm and generous. She smoked all the time – it is amazing that she lived to such a ripe old age.

I know that her colleagues at Bohr's institute were unable to understand why she did not leave until after the Anschluss [annexation of Austria into Nazi Germany]. Her work



Tage Erlander, Prime Minister of Sweden, 1946–1969.

at the institute in Berlin was her whole life and although she was advised to flee she could not bring herself to leave. She “only” had herself to think about with no family to consider, and she did not know if she would be able to continue her research in another country.

She loved nature and happily and graciously accompanied us on our outings in Dalarna. She reminded us of a squirrel. Lise was very interested in music and I remember one evening in particular at her home when she played Schubert’s melancholy but infinitely beautiful final quintet for my brother Gerhard, her assistant Robert Vestergaard and me on her gramophone.

We shared a love for an Austrian author named Adalbert Stifter, “The Austrian Goethe”, who has written many short stories and novels inspired by nature. Lise was a very straightforward, moral person and I admired her.

She visited us many times and was always compassionate, warm and interested. During my subsequent visits to Stockholm with my children we always met up with her.

Tage Erlander (text 1960/2010):

Sunday 20 March 1960 at 7.50.

Accompanied Aina to the 7.30 train. She had errands in Örebro this beautiful Sunday when she should really have stayed and relaxed with the rest of us on Harpsund. It is a shame that the children are not here either as we have such a lot of exciting guests: Niels Bohr and Lise Meitner to name just two.



Lise Meitner and Niels Bohr on Harpsund 20/21 March 1960. Foto: Sven Erlander

8.55 train Stockholm–Flen 20 March 1960

After accompanying Aina to the 7.30 train (errands in Örebro), I am now on my way to Harpsund for a discussion, the participants in which are at least of a level that ought to guarantee a worthwhile conversation. However, I am far from certain about it. Last time more than a decade ago when Östen Undén, Gustav Möller and Torsten Gustafsson tried to make us understand what Niels Bohr wanted us to do on the issue of atomic weapons,

the result was far from successful. He is not easy to understand, but we will see how the younger crowd of Kling, Åström and Palme react.

Harpsund 21 March 1960.

How different things can be from one day to the next! Yesterday's big dinner was certainly one of the least successful we have ever had, despite all of the bigwigs at the table. Although Niels Bohr was not completely opaque, he was very difficult to understand. It seemed as if Herman Kling in a separate conversation with him had begun to understand what it was about. But it was still a mystery.

Today things were very different. I can hardly say when I have experienced such a splendid morning. I now think I understand quite clearly what Bohr means.

Karl-Erik Larsson (text 1999)

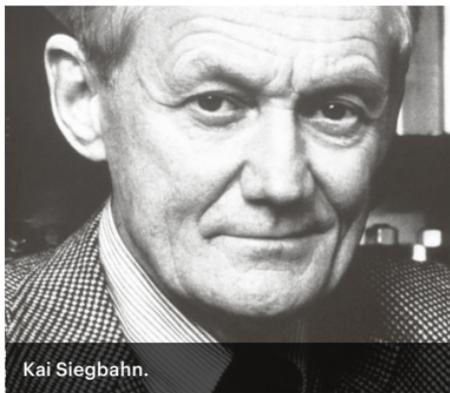
Many people later believed that Lise Meitner contributed to the Swedish atomic project. This was, however, not the case. Born in 1878, she was already of an advanced age when we were in our most active phase 1950–55. But it was stimulating to see this elderly lady in a white lace collar with a handkerchief in her hand – a top physicist from a world and an era in which it was unusual to say the least, or even forbidden, for women to take part in higher education, namely in Vienna around the turn of the century, at a time when Ludwig Boltzmann held his famous lectures in subjects such as kinetic gas theory. There were still at that time scientists who doubted the existence of atoms...



Robert Otto Frisch.



Curt Mileikowsky.



Kai Siegbahn.



Karl-Erik Larsson.

Curt Mileikowsky (text 1989)

But now back to 1947. That is when I had the opportunity to work with Lise Meitner for a while. It was on Drottning Kristinas väg. She had limited resources; there were pens, paper, stopwatches and some foils of various materials, plus a water tank to study the slowing down and capturing of neutrons etc. She was a charming old lady, but I remember very well that she became quite upset when I was suddenly called up for military service.

Robert Otto Frisch (text 1978)

Lise Meitner remained in Sweden for 22 years. She learnt Swedish, built up a small research group and published a number of short papers; when my parents came to Stockholm in 1939 she shared their apartment. She had worried about the development of nuclear weapons and refused to take part in it when invited to do so. Their success distressed her greatly, but she hoped for the peaceful use of fission, and Sigvard Eklund, busy building the first Swedish reactor, became her life-long friend.

She had a great gift for friendship: her surviving friends remember her lively interest in simply everything, and her infectious enjoyment of good company. Many children, now grown up, remember her as the affectionate “Auntie Lise”, whether related or not. Her prizes, academy memberships and honorary doctorates meant little to her, and she disliked any kind of publicity. History will remember her trying, early in our century, to understand better what matter is made of, with no thought of gain or fame.

Kai Siegbahn (text 1968):

Lise Meitner was one of the most famous researchers in Germany who was forced to flee the country in the 1930s. Most found refuge in the United States with its research-friendly climate, but Meitner preferred our country and worked here for many years.

Her name is in particular linked with the prehistory of the release of atomic energy. But long before this, Meitner made a name for herself in Germany as one of the leading researchers in the now classic nuclear physics field, i.e., radioactivity.

Meitner was not only a great scientist but also a person with great warmth. She continued her research for many years at the Nobel Institute for Physics in Frescati. For those of us working there at the time, she was a constant source of inspiration – a person we remember with gratitude as we now learn of her passing.

Concluding comments

The texts of the lectures that Lise Meitner held in 1963 and Sigvard Eklund in 1989 – parts of which have been reproduced here – are so long that each of them would have filled this booklet. Interested readers are referred to the printed versions in the bibliography. The picture of Lise Meitner painted by the voices above is one of a scientist driven by perhaps the most important quality a scientist can have – curiosity. This is the quality



In 1951 the first so-called Nobel Laureate Days were held in Lindau. From 1954 onwards, each year those invited included young scientists who gained inspiration by spending time with the Laureates. Lise Meitner was invited to take part in 1962. Here she is standing next to Otto Hahn, Werner Heisenberg and Max Born.

that in 1934 drove her to suggest to chemist Otto Hahn that they work together on neutron irradiation of uranium. In 1938 this collaboration resulted in the discovery and understanding of the splitting of the uranium atom – the basis for nuclear energy, but also for the atomic bomb. Lise Meitner downplays what is described as her leading role in the project and in doing so demonstrates what is perhaps a less common trait in a scientist – humility. Otto Hahn received the 1944 Nobel Prize in Chemistry with the citation “for his discovery of the fission of heavy nuclei”. Although much has been written about the decision, there is no space to include this discussion here. Suffice it to say that many (including the author of these lines) feel that the entire research team of Lise Meitner, Otto Hahn and Fritz Strassmann should have been jointly awarded the 1944 Nobel Prize in Chemistry.

Lise Meitner’s CV and the voices we hear in this booklet bear witness to the fact she was a strong driving force and highly innovative scientist. She did not allow herself to be restrained by the conventions of the day regarding women in science, nor by geographical, language or political boundaries. She was a researcher who, in addition to her scientific abilities, was also clearly committed to her fellow man and to society. She had many friends and is still a role model and a source of inspiration to both young and established scientists for, among other things, highlighting the fact that research can have both positive and negative consequences. She took a stand against the development of the first atomic bombs and the nuclear weapons that would later dominate the “terror balance”.

Literature in order of when it was printed

Otto Robert Frisch: Möte med atomerna, Natur & Kultur 1948 (foreword by his aunt Lise Meitner).

C.A. Strömberg (ed.): Teknis i bild – Research and Technical Education in Sweden, C.A. Strömberg Aktiebolag 1952 (incl. the portrait of Lise Meitner on the cover of this booklet).

Carl Seelig (ed.): Helle Zeit – Dunkle Zeit, in Memoriam Albert Einstein, Europa Verlag 1956 (with contributions from Hahn, Meitner, Frisch and many others, Lise Meitner's contribution is entitled "Kein Anteil an der Atombombe").

Lise Meitner: Lise Meitner looks back, Internal report, AB Atomenergi, 1964.

Lise Meitner: Looking back, Bulletin of the Atomic Scientists, v. 20 (1964) p. 2.
(All issues of this journal are available on Google Books.)

Otto Robert Frisch: Atomen i närbild, Rabén&Sjögren 1965 (incl. the story about the splitting of the uranium atom, with several drawings provided by AB Atomenergi and the Swedish National Defence Research Institute, including one of the R2 reactor in Studsvik and a map of nuclear power stations and adjacent installations in Scandinavia.

Kai Siegbahn: Lise Meitner's death, in Dagens Nyheter newspaper, 28 October 1968.

Robert Otto Frisch: Lise Meitner, nuclear pioneer, New Scientist 9 November 1978.

Horst Wohlfart (ed.): 40 Jahre Kernspaltung, Wissenschaftliche Buchgesellschaft Darmstadt 1979 (Contains original articles by Hahn and Strassmann, Meitner and Frisch and many others).

Göran Nilzén: Lise Meitner, in Svenskt Biografiskt Lexikon, volume 25 (1985–87), page 337.

Per Carlson (ed.): Fysik i Frescati 1937–1987. Lectures from the anniversary conference on 23 October 1987. Gotab 1989 (incl. lectures by Sigvard Eklund and Curt Mileikowsky).

Sigvard Eklund: Lise, Atomfysikerin – Lise Meitner, kärnkraften och Kungälv, Årsskrift Föreningen Gamla Kungälv 1989 (Lecture at the placement of a commemorative plaque in Kungälv).

Ingmar Bergström: Lise Meitner och atomkärnans klyvning, KVA:s årsredogörelse för 1999, page 17 (KVA struck a commemorative medal depicting Lise Meitner and Ingmar Bergström who, like Meitner, worked with Manne Siegbahn, held the presentation).

Jim Ottaviani, et al: Dignifying Science. Stories about women scientists. G.T. Labs, Ann Arbor, 1999 (graphic short stories, including one about Lise Meitner).

Karl-Erik Larsson: Vetenskap i kärnkraftens skugga, published by the author, 1999.

Sven Erlander (ed.): Tage Erlander Dagböcker 1945–1949, published by Gidlund 2001.

Ruth Gregersen: Unpublished memoirs, 2003.

Jim Ottaviani and Leland Purvis: Suspended in Language – Niels Bohr’s life, discoveries, and the century he shaped, G.T. Labs, Ann Arbor, 2004 (graphic novel in which Meitner appears).

Bengt Forkman: Lise Meitner – en levnadsteckning, published by Gidlund 2006.

Sven Erlander (ed.): Tage Erlander Dagböcker 1960, published by Gidlund 2010.

Mattias Berg: Dödens triumf, Natur & Kultur 2016 (suspense novel that, among other things, asks the question “What did Lise Meitner do in the 1950s?”).

Anders Bárány: Möten med Nobelpristagare, i Personligt Öster om Leden, Österlen-Akademien 2017 (incl. some information on the Nobel Laureate Days in Lindau).

The Royal Swedish Academy of Engineering Sciences (IVA) is an independent, learned society that promotes the engineering and economic sciences and the development of industry for the benefit of Swedish society. In cooperation with the business and academic communities, the Academy initiates and proposes measures designed to strengthen Sweden's industrial skills base and competitiveness. For further information, please visit IVA's website at www.iva.se.

Published by the Royal Swedish Academy of Engineering Sciences (IVA),
Professor em. Anders Bárány

IVA, P.O. Box 5073, SE-102 42 Stockholm, Sweden

Phone: +46 8 791 29 00

E-mail: info@iva.se

Website: www.iva.se

IVA-M 524 • ISSN 1102-8254 • ISBN 978-91-89181-10-6

Editor: Anna Lindberg, IVA

Translation: Diane Högsta

Layout and production: Pelle Isaksson, IVA

Printed by EO Grafiska, Stockholm, Sweden, 2020



Royal Swedish Academy of
Engineering Sciences

IVA-M 524 • ISSN 1102-8254 • ISBN 978-91-89181-10-6