= Hilde Levi =

Hilde Levi (9 May 1909 ? 26 July 2003) was a German @-@ Danish physicist . She was a pioneer of the use of radioactive isotopes in biology and medicine , notably the techniques of radiocarbon dating and autoradiography . In later life she became a scientific historian , and published a biography of George de Hevesy .

Born into a non @-@ religious Jewish family in Frankfurt , Germany , Levi entered the University of Munich in 1929 . She carried out her doctoral studies at the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry at Berlin @-@ Dahlem , writing her thesis on the spectra of alkali metal halides under the supervision of Peter Pringsheim and Fritz Haber . By the time she received it in 1934 , the Nazi Party had been elected to office in Germany , and Jews were no longer allowed to be hired for academic positions . She went to Denmark where she found a position at the Niels Bohr Institute of Theoretical Physics at the University of Copenhagen . Working with James Franck and George de Hevesy , she published a number of papers on the use of radioactive substances in biology .

When the Nazis began rounding up Danish Jews in September 1943 , Levi fled to Sweden , where she worked for the biologist John Runnström at the Wenner @-@ Gren Institute for Experimental Biology in Stockholm . After the war ended , she returned to Denmark to work at the Zoophysiological Laboratory in Copenhagen . She spent the 1947 ? 48 academic year in the United States learning about the recently discovered techniques of radiocarbon dating and autoradiography , which she introduced to Europe . She retired from the Zoophysiological Laboratory in 1979 , but became involved with the Niels Bohr Archive , where she collected papers of de Hevesy , eventually publishing his biography .

= = Early life = =

Hilde Levi was born in Frankfurt , Germany , on 9 May 1909 , the daughter of Adolf Levi , the sales director of a metal company , and his wife Clara (née Reis) , the daughter of a printer . Hilde had an older brother called Edwin . She was a gifted musician who learned to play the piano at a young age . During the summers , she would listen to performances at her cousins ' summer house in Bavaria by musicians including Elisabeth Schumann and Richard Strauss .

Although Jewish , Levi 's family did not practise their religion , and were not part of the Jewish community , but when she was enrolled at the Victoria School (now the Bettina School) in Frankfurt , her religion was listed as Jewish . Religious instruction was compulsory , so she had to attend classes with a local rabbi . She soon rebelled against this , and told her parents that she did not wish to attend the classes . She came to reject formal religion .

While at high school , Levi decided that she would become a scientist . Her final year was devoted to a physics project on spectra and photography , which became her Oberreal Abiturium . She was the only girl in her class to major in physics that year . After her graduation in April 1928 , her father sent her to England for six months to learn English and good manners . She entered the University of Munich in 1929 , where she listened to lectures by Arnold Sommerfeld . For her doctorate , her father managed to get her accepted into the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry at Berlin @-@ Dahlem , where she wrote her thesis on the spectra of alkali metal halides , under the supervision of Peter Pringsheim and Fritz Haber .

= = Nazi period = =

By the time Levi received her doctorate in 1934 , the Nazi Party had been elected to office in Germany . Her supervisors had gone into exile , and Jews were no longer allowed to be hired for academic positions . The Danish branch of the International Federation of University Women helped Levi find a position at the Niels Bohr Institute of Theoretical Physics at the University of Copenhagen in Denmark . Niels Bohr asked James Franck , another refugee from Germany , if he knew Levi , and would be willing to have Levi as his assistant . Franck replied that he did not know her

personally , but he knew her thesis , and rated it highly .

She became engaged to the physicist Hans Bethe in 1934 . The two had known each other since 1925 . However , his mother , although herself Jewish , was opposed to her son marrying a Jewish girl , and he broke off the engagement a few days before the wedding was to take place . Bethe 's action shocked Franck and Bohr . Although an eminent physicist , Bethe would not be invited to visit the Niels Bohr Institute until after the Second World War . Levi never married , but became friends with many of the physicists who did visit the Institute , including Otto Frisch , George Placzek , Rudolf Peierls , Leon Rosenfeld , Edward Teller and Victor Weisskopf .

Levi worked as Franck 's assistant , publishing two papers with him on the fluorescence of chlorophyll , until he left Denmark for the United States in 1935 . She then became assistant to the Hungarian physical chemist George de Hevesy . The recent discovery of induced radioactivity and the consequent creation of short @-@ lived radioactive isotopes opened up a number of new uses for radioactive substances in biology which she explored with de Hevesy , publishing a number of papers with him . The University of Berlin cancelled Levi 's doctorate in 1938 . In April 1940 , the Germans occupied Denmark . When the Nazis began rounding up Danish Jews in September 1943 , Levi was one of the thousands of Jews who fled to Sweden . For the rest of the war she worked for the biologist John Runnström at the Wenner @-@ Gren Institute for Experimental Biology in Stockholm .

= = Later life = =

When the war ended , de Hevesy elected to stay in Sweden , and Bohr decided to drop biological research at the Institute and return to concentrating on physics . Levi accepted a position at the Zoophysiological Laboratory in Copenhagen , under August Krogh , who , like Bohr , had won a Nobel Prize . She spent the 1947 ? 48 academic year in the United States as a Fellow of the American Association of University Women . While there , she learned from Willard Libby at the University of Chicago about his recently discovered technique of radiocarbon dating . She developed the new technique of autoradiography while working for the United States Atomic Energy Commission at the University of Rochester in Rochester , New York .

On returning to Denmark , she worked with the National Museum of Denmark in Copenhagen to develop radiocarbon dating equipment . This was put to the test in 1951 , dating the Grauballe Man . Autoradiography was then used by the Finsen Institute to investigate the effects of the radiocontrast agent thorotrast . Levi was a consultant at the Danish National Board of Health from 1952 to 1970 .

Levi retired from the Zoophysiological Laboratory in 1979 , but became involved with the Niels Bohr Archive , where she collected papers from de Hevesy . The result of this work was a biography of Hevesy , which was published in 1985 . That year she organised the Niels Bohr Centennial Exhibition at the Copenhagen Town Hall . In 2001 she was honoured by Humboldt University of Berlin , along with other students who had been dismissed in 1933 . She died in Copenhagen on 26 July 2003 .