

The justice delayed—the case of Lise Meitner

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'Fame is the food of the dead', and the Hall of Fame the shelter of the dedicated who stretch themselves to grasp the heavens in that solitary, slippery moment of revelation. But Lise Meitner was a woman and therefore had to pay a surcharge, which she could ill afford. Until the biographer Ruth Sime decided to delve deep into the world of petitions, processions, slogans, representations and memoranda, and managed to disgorge the deserved. Scientists also seem to need agents to sell them to the public in the Hollywood tradition.

*Nature*¹ reckoned, 'Meitner receives her due'. Did she really? The biographer is praised for her perseverance; the scientific community, which proposed recension of the discovery table designed by Meitner and used together with Hahn, appears as a model of magnanimity; the Hall of Fame of the Deutsches Museum gets a face-lift—with Lise Meitner's face. But for Meitner herself, it may just be too late.

Lise Meitner obtained a doctorate in physics at the University of Vienna in 1906. She worked for a while with Max Planck before joining the Kaiser Wilhelm Institute for Chemistry in 1913, where a long collaboration with Otto Hahn began, in the field of radioactivity, on investigating and interpreting the physical properties of radioactive materials. Meitner had many firsts to her credit. The systematic pursuit of neutron-bombardment experiments led to the identification of a new element, protactinium. She was the first to propose that the beta line spectrum is produced when a gamma ray from a nucleus causes electrons to be ejected from the K, L and H shells. She also demonstrated that this process follows radioactive dis-

integration. The emission of (Auger) electrons instead of X-rays when an electron from an L shell falls into a vacancy in the K shell, and the tracking of electrons and positrons formed by the decay of gamma rays in the Wilson cloud chamber are other processes in the study of which Meitner made pioneering contributions.

From all accounts, it appears that Meitner was well recognized and respected for most of her achievements, except when it was most necessary. A physicist by training and taste, she had the courage and conviction to suggest an explanation of the bizarre result obtained by Otto Hahn, in which a uranium nucleus, when gently nudged by a neutron, split into two. Meitner had such faith in Hahn's experimental acumen that she started to work out a model of the splitting nucleus without pausing to question the correctness of the observation. Soon, Meitner, a Jew, had to flee from Austria to Sweden. There she met her nephew Otto Frisch in Gothenburg. The story of the lonely aunt and the loyal nephew in the snowy woods of Sweden, fantasizing about the strange split, is well described in *The Discovery of Nuclear Fission: A Documentary History* by Graetzer and Anderson and in Otto Frisch's talk, 'The discovery of fission', published in *Physics Today* (1967). It turned out (after an idea due to Bohr) that it was more appropriate to think of a nucleus as a drop of a fluid where neutrons and protons behaved like molecules. The strong internucleon attraction acquires the role of surface tension, due to which the nucleus retains its spherical shape. But what if the drop is disturbed, say by a bombarding neutron? Two routes are possible. The excess energy may be

released as a gamma-ray photon, or the drop may set into oscillation, undergoing continuous deformation into an elongated or flattened form. In uranium oscillations are preferred to gamma-ray emission. The repulsion between the positive charges at the two ends of the elongated nucleus may exceed the restoring effect of the surface tension and the nucleus splits, with a violent release of large amounts of energy.

Meitner received several awards for her pioneering efforts in a multitude of fields. But why didn't she share the Noble Prize for the discovery of nuclear fission? Historians are researching the reasons. Why did Hahn deny her the credit for the discovery of fission? Her absence from the scene of action did not deter Hahn from harnessing the support of Meitner the physicist to dispel his fears of other physicists. The Meitner-Hahn collaboration is so well documented because of that very absence that one cannot dismiss the case as negligence. It was not that the social laws of the time did not permit women to exact acclaim. Hahn's rejection of Meitner's contribution might have another twist to it which historians and biographers may or may not bear out. If they had been married, they would possibly have shared the Nobel Prize, as did some other couples at the time. Meitner was denied not only a Nobel Prize but all that would have been triggered by it. But, as the Urdu poet Ghalib said: 'You need a lifetime to get convinced. Who will live to see the day?'

1. Dickman, S., *Nature*, 1989, **340**, 497.

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