The observer

Following her arts degree, multi-talented **Mathilde Hertz** pursued a career in science. In the 1920s and 1930s she conducted research in the fields of animal psychology and sensory physiology at the **Kaiser Wilhelm Institute for Biology** in Berlin – until the Nazi regime put an end to her career.

TEXT **ELKE MAIER**

The hermit crab is in a hurry. It has just been expelled from its mollusc shell and is now teetering around the water basin without protection. To ward off possible predators, it needs a new shelter as quickly as possible. But which one to choose?

To learn about the criteria that crabs use to select their dwelling, Mathilde Hertz would chase the animals out of their shells and then offer them different alternatives – both natural ones and models made from plaster. She meticulously recorded her subjects' reactions.

It was the winter of 1932/33, during which the scientist spent a number of months studying hermit crabs at the Laboratorio biológico-marino in Majorca. She normally worked at the Kaiser Wilhelm Institute for Biology in Berlin-Dahlem, where she conducted research on carrion crows and jays, as well as honey bees and cabbage white butterflies. She was extremely productive and her work was published in renowned specialist journals. Nobody thought that her career would soon be over.

Extraordinarily talented: Mathilde Hertz was a visual artist and animal psychologist, and one of just a few women in Germany to qualify as professor in 1930.

Nowadays, only few people know about Mathilde Hertz, while the complete opposite is true for her father. The physicist Heinrich Hertz is famous for proving the existence of electromagnetic waves, thus paving the way for wireless communication. The frequency unit 'hertz' was named after him. His daughter, Mathilde Carmen, was born in Bonn on January 14, 1891. She was just under three years of age when her father died at only 36.

After graduating from high school, Mathilde Hertz took up art studies in Weimar, Karlsruhe and Berlin and then worked as a sculptor. Unable to live off her art alone, she accepted a job at the library of the Deutsches Museum in Munich in the fall of 1918. The zoologist and privy councilor Ludwig Döderlein, who became the Director of the Bavarian State Collection of Zoology in Munich in 1923, noticed her drawing and sculpting skills. He instructed her to help with the preparation of sculptural reconstructions of fossil sets of teeth. This was not just an opportunity for the young woman to practice her observation skills; she also developed an interest in the animals' phylogenetic history. She attended lectures in zoology and palaeontology and conducted scientific studies of prehistoric teeth. In 1925, she obtained her doctorate with her thesis *Observations of primitive mammalian teeth*. Her doctoral supervisor, the zoologist Richard von Hertwig, awarded her the top score of summa cum laude.

This was how Mathilde Hertz gained entry into the world of science. She moved on from fossil mammalian teeth to modern day echinoderms: under Döderlein's supervision, she worked on brittle stars that were discovered in the German deep-sea expedition of 1898 and 1899 and the German Antarctic expedition of 1901 to 1903.

The researcher was then granted a scholarship that took her to the Bavarian State Collection of Zoology in Munich, and she eventually moved to Berlin in 1927. The Kaiser Wilhelm Institute for Biology offered attractive working opportunities, including for women. Mathilde Hertz conducted research in the Department for Animal Genetics and Biology that was led by Richard Goldschmidt. The quality of her work was so impressive that she was not only awarded a position as an assistant, but a building was fitted out especially for her, where she was able to conduct independent experiments without any further work duties.

Inspired by the work on the problem-solving behavior of chimpanzees by the psychologist Wolfgang Köhler at the anthropoid research station in Tenerife, Mathilde Hertz began to research the area of animal psychology. She was particularly interested in the abilities and achievements of animals. Hertz believed in what was known as Gestalt psychology, according

Photo: TU Darmstadt

Busy as a bee: in hundreds of individual experiments, Mathilde Hertz observed the flight patterns of bees and the food sources that attracted them most.

to which animals and their interaction with their environment must be considered as a whole. The approach of Gestalt psychologists is based on the notion that "the whole is greater than the sum of its parts." Perception could therefore only be understood as a whole, and not by breaking it down into ever smaller units.

Mathilde Hertz made a name for herself in expert circles, especially with her comprehensive work on the visual perception of honey bees. She placed different black-and-white figurines on a table, interspaced with bowls of sugared water. In hundreds of individual experiments, she observed the flying patterns of bees, and noted down the food sources the bees were particularly attracted by. This allowed her to draw conclusions regarding the shapes and patterns to which bees respond most strongly.

In 1930, Mathilde Hertz was one of only a handful of women in Germany who obtained the qualification for professorship, for her work entitled "*The organization of the optical field of honey bees*". Assessment committee member Wolfgang Köhler praised "Miss Hertz' outstanding talent" and the relevance of her research: "Each of her projects has significantly advanced animal psychology, as well as general Gestalt psychology."

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» The president of the Kaiser Wilhelm Society an undisputed authority figure of science in Germany, Max Planck, campaigned on her behalf. He explained that Ms Hertz should be classified as "Aryan" due to her family background, and also pointed out that the dismissal of the famous scientist's daughter would make a bad impression overseas.

She was then granted full authorization to teach zoology at universities. Between 1930 and 1933, she gave various lectures at Berlin's Friedrich Wilhelm University as a senior lecturer. She held colloquia, conducted research, and supervised staff members and doctoral researchers at the Kaiser Wilhelm Institute. Mathilde Hertz appeared to be destined for a distinguished career.

Then she received a letter from the Prussian Minister of Science, Arts and National Education, dated September 2, 1933: "To Miss Dr. Mathilde Hertz in Zehlendorf, Andréezeile 69: Pursuant to § 3 of the Law for the Restoration of the Professional Civil Service of April 7, 1933, I hereby revoke your authorization to teach at the University of Berlin." An "Expert for Race Research" had classified her as non-Aryan.

Mathilde Hertz was doubly affected, as the new civil service law also applied within the Kaiser Wilhelm Society. As a result, she was also threatened with expulsion from her research institute. Unlike at the university, however, she had a prominent advocate there. She was supported by Max Planck, the President of the Kaiser Wilhelm Society. In a letter to the Reich Minister of the Interior, he appealed for the "urgent reconsideration of the administration," pointing out that it would be "gratefully acknowledged at home and abroad, if the daughter of Heinrich Hertz, the sole discoverer of wireless waves, could continue her scientific work." Surprisingly, the answer was positive: Mathilde Hertz was permitted to stay on at the institute.

However, for her, this was only a deferral. The situation in Germany affected her so strongly that she decided to emigrate to England a year later. In January 1936, she set up her new workplace at the Researcher Department of Zoology at Cambridge University. She moved into a little terraced house on 3 St. Margaret's Road, Girton, Cambridge. Her mother and her sister, the paediatrician Johanna Hertz, who was four years older than Mathilde, followed her six months later.

The working conditions at Mathilde Hertz' new research unit were favorable, but even so, her productivity decreased rapidly. She gave up her work entirely around 1939/40 and never returned to it. It remains unclear to this day what prompted her to abandon science. Possible triggers may have been severe family problems, such as her mother's death or her sister's mental illness, as a result of which she was eventually institutionalized. In 1942, Mathilde Hertz described herself as "sick and unable to perform any scientific work, now or in the future." Her emigration, and in particular the fact that Germany and England were at war, were a cause of great sorrow to her.

Mathilde Hertz spent the following years living in impoverished circumstances: "Visiting her made me sad. The daughter of a great scientist is living in a miserable and reclusive state, and is dependent on the charity of a foreign people," a visitor wrote in 1956. He reported that the old lady was living in complete seclusion in two little rooms, and that she was almost blind in one eye. He described her as being too proud to accept any money, simply because she was Heinrich Hertz' daughter.

This prompted the physicist and Nobel Prize winner Max von Laue to step in – with success. Mathilde Hertz was granted a modest pension and a compensation, based on the fact that under other political circumstances in Germany, she would most likely have been appointed Associate Professor. Mathilde Hertz died in Cambridge at the age of 84 and was buried next to her father in the family grave in Olsdorf Cemetery in Hamburg.

She authored more than 30 scientific publications, all of which were written between 1925 and 1935. Mathilde Hertz also left her mark as an artist: the Hall of Honor of the Deutsches Museum is home to a marble bust of her father that was made based on her designs.

Photo: Damien Tupinier/Unsplash