



Some of Germany's important Jewish mathematicians, clockwise from left: Otto Blumenthal, Max Dehn, Hilda Geiringer, Leon Lichtenstein (center), and Emmy Noether (at left).

Time to do the math

Setting the record straight about Jewish mathematicians in Nazi Germany

A new exhibition at Beth Hatefutsoth highlights the contributions of - and injustices done to - Jewish mathematicians in wartime Germany.

By Ofer Aderet

The string quartet that performed one night last week at Beth Hatefutsoth Museum of the Jewish Diaspora played a work by the German-Jewish composer Felix Mendelssohn. The violin whose sounds filled the hall that night once belonged to Georg Pick, a well-known Jewish mathematician from Vienna. He is best known for his eponymous formula, which concerns the connection between number theory and geometry, and he was said to have played this instrument along with his friend Albert Einstein, who also played the violin.

On July 13, 1942, Pick was deported to the Theresienstadt concentration camp; two weeks later he died there, at the age of 82. Dr. Ruti Ungar, an Israeli historian who lives in Germany, brought this violin especially for the opening of the new exhibition she has curated, which is called "Transcending Tradition: Jewish Mathematicians in German-Speaking Academic Culture," and which is on through December 14. Ungar's grandfather, Herbert Ungar, was a friend of Pick's. A few days before Pick was sent to his death, he gave Ungar the violin. Herbert Ungar survived the Holocaust and hid the instrument until the war ended.

Despite the considerable contribution Jews have made to the field of mathematics, it's not necessarily one of the fields that people imagine of when they think of great Jewish achievers: Jewish lawyers, doctors and psychologists have shunted the mathematicians aside in the popular imagination. Says Prof. Dan Amir, of the school of mathematical sciences at Tel Aviv University:

"In mathematics there is no Nobel Prize and no sensational discoveries that are admired or understood by lay people."

An explanation of another sort is given by Prof. Christian Baer, president of the German Mathematical Society and a professor at Potsdam University.

"For decades after the war we ignored the issue of the fate of the Jewish mathematicians," he says, during our interview in Tel Aviv. "We were afraid to discover unpleasant and painful things, so we preferred not to dig too deeply into the past. I feel ashamed that so much time passed before the Society began to research its Nazi past."

Contemporary German mathematicians tended to believe that the Nazis had wrested control over the mathematical society during the war years, and that its members were victims of that dictatorial regime. However, the opening of the organization's archives in the 1990s revealed an entirely different story.

"There is no doubt that most of the German mathematicians who were members of the professional organization collaborated with the Nazis, and did nothing to save or help their Jewish colleagues," says Prof. Moritz Epple of Frankfurt University, an expert on the history of mathematics.

Epple, who headed the research project on which the exhibition is based, elaborates: "Except for a few individual cases, the mathematical society didn't care about the Jews. They collaborated with the state and with the party at every level. They took active steps and expelled the Jewish members even before they were compelled to - to be in step with the spirit of the times."

The Beth Hatefutsoth exhibition aims to address this historical injustice, says curator Ungar: "We decided to show, for the first time, the tremendous contribution Jews made to mathematics in all its branches. Jews contributed to the breaking of the mathematical tradition and brought modernization to it. Via mathematics, they also blazed the trail beyond the traditional Jewish professions, and crossed geographical and religious boundaries on the way to forging international cooperation among mathematicians from different countries."

The exhibition has come to Tel Aviv thanks in part to funding from the German government. It will move on in the coming months to the Technion-Israel Institute of Technology, in Haifa, and the National Library, in Jerusalem. The exhibition is the result of extensive research undertaken in recent years by seven historians of mathematics from Germany: For the first time they were able to gather personal details related to the top Jewish mathematicians active in their country's academic world before and around the time the Nazis rose to power.

The list the historians put together consists of about 90 names of Jewish mathematicians who achieved the level of professor, along with their birth and death dates, and their places of employment. Some of them became world famous thanks to mathematical formulas named after them. One such person was Carl Gustav Jacob Jacobi (after whom the Jacobi matrix is named) - the first Jewish mathematician to hold the position of professor at a German university. In 1832 Jacobi took up the prestigious appointment at Koenigsberg University; by that time, however, he had already converted to Christianity.

A quarter of a century later, mathematician Moritz Abraham Stern was the first Jew to become a full professor at a German university without changing his religion. In 1859 he received the post at the University of Goettingen, which later was considered the "Mecca of mathematics" in the country.

Making their mark

At the peak of their activity, between the outbreak of World War I in 1914 and the Nazis' rise to power in 1933, one-third of all math professors in Germany were Jewish - although Jews constituted less than 1 percent of the total population. These mathematicians served on the editorial boards of leading academic journals and were involved in the founding of the mathematical society. Jews also contributed greatly to changes in a number of areas of their field and undertook revolutionary research. There is no dearth of examples: Hermann Minkowski and Edmund Landau, in number theory; Ernst Steinitz and Emmy Noether, in algebra; Felix Hausdorff and Abraham Fraenkel, in set theory and topology; Adolf Hurwitz, in theory of functions; Max Dehn, in geometrical topology; and Paul Bernays, in the philosophy of mathematics.

"Up until 1933, mathematical life in Germany and its German-speaking neighbors was to a large extent German-Jewish," says Epple. "[The Jewish mathematicians] made their mark on the entire world."

His colleague Christian Baer adds: "Mathematics today would be entirely different were it not for the contributions made by Jews. I can't imagine how it would look."

Three of the Jewish mathematicians on the list the historians compiled committed suicide after the Nazis rose to power and two were killed in the Holocaust. The rest managed to emigrate: Five of them made their way to Israel, among them Abraham (Adolf) Halevi Fraenkel, an extraordinary man of many accomplishments. At the age of 19 he wrote an article comparing the Jewish, Muslim and Christian calendars. During World War I, Fraenkel served in the German army as a medic and meteorologist. During that period he wrote an article describing the trajectory of a missile in light of the theory of free fall. In the 1920s he was a professor at the Universities of Marburg and Kiel. In 1929 he left Germany and immigrated to Palestine. First he consulted with Ashkenazi Chief Rabbi in Palestine Abraham Isaac Kook to find out if, as a religious Jew, he could accept a post as a professor at the Hebrew University of Jerusalem. Kook recommended that he do so - to strengthen religious Judaism at the university. "It is our obligation to fight for ... a respectable position within [that institution] for the sake of faith in Judaism and to increase its influence," Kook explained. Subsequently Fraenkel became the dean of the mathematics faculty and, at the end of the 1930s, university rector. Later he taught at Bar-Ilan University. In 1956 he was awarded the Israel Prize in the field of the exact sciences.

Fraenkel was a stickler for the Hebrew language, which he had taught himself before he came to Israel, and was also blessed with a well-developed sense of humor. Once, it was said, when he was riding a bus to Mount Scopus, a student asked the driver to close the window "because it is cold outside." Fraenkel said to her: "And if he closes the window, will it be hot outside?"

In a speech he delivered in 1944 in Jerusalem, he complained about what he saw as a national trait of being late to events. "You are invited to an assembly, a meeting or a party at a certain time. You have bought a ticket to a theatrical performance or for a ride in an inter-city taxi for a certain hour - but if you come at the designated time, you have made a mistake and you will be punished. This is because there are people who come half an hour or even an hour late, and of course ... it is those who come on time who must be punished and the latecomers must be rewarded, as we wait for them and delay the start [of an event] because of them ... We have a concept of Jewish precision and not of German precision."

Fraenkel was active in instilling awareness of the world of mathematics in the general public; he edited the math entry in the Hebrew Encyclopedia and wrote a number of others. In the 1950s he published the book "An Introduction to Mathematics" in five volumes, which was the first of its kind in Hebrew. He died in Jerusalem in 1965.

Despite discrimination

Jewish women were also respectably represented in the world of mathematics in the 20th century in Germany, despite gender and racial discrimination. Emmy Noether, who was born in Erlangen, and is also mentioned in the exhibition, was the first woman appointed to an academic position at a German institution of higher education: In 1916 she began to teach at the University of Goettingen. Noether, daughter of Max Noether, the most important professor of algebraic geometry in Germany, is considered to this day to have been the greatest female mathematician up until that point, and as having changed the face of algebra. Initially she had to work under the supervision of a man, and even after she received an official appointment, she was never promoted to the rank of full professor and even worked for a number of years without pay. Even when one of the most important mathematicians of the era, David Hilbert, tried to help her receive an appointment as professor, his colleagues at the faculty of philosophy, to which mathematics belonged at the time, opposed his efforts.

"What will our soldiers think, when they come back to the university to study and find they are expected to sit at the feet of a woman?" they wondered. To this Hilbert supposedly replied: "I can't see why the candidate's sex should be an argument against candidacy. After all, the university is not a bathhouse."

Noether, too, left an eponymous mathematical legacy: Her theorems deal with mathematical aspects of Einstein's theory of relativity. In 1933 she was thrown out of her university together with the rest of the Jewish academics in Germany.

The situation was particularly dire at Goettingen: Three out of four of the heads of the university's mathematics and physics institutes had been Jews. Not long after the mass expulsion, a reception was held at the university, at which Nazi education minister Bernhard Rust met the former director of the mathematics institute. Rust asked him if it had been harmed by the expulsion of the Jews.

"It has not been harmed, sir," replied the former director. "It has simply ceased to exist."

Noether managed to leave Germany in 1933. She spent the next two years in the United States, where she died at the age of 52 from complications following surgery. Fifteen years later Albert Einstein eulogized her: "In the judgment of the most competent living mathematicians, Fräulein Noether was the most significant creative mathematical genius thus far produced since the higher education of women began."

Felix Hausdorff, who was born in 1868, studied at Leipzig University. In addition to mathematics, he was also interested in philosophy. He later taught at Bonn University. His impressive status initially enabled him to continue working even after the Nazis rose to power. In 1935 he was forced to retire, under bad conditions. His work of 40 years was termed by the Nazis "decadent Jewish mathematics," but he continued to publish articles and hoped he would be able to remain in Germany without being harmed.

However, in early 1942, when Hausdorff realized he would not be able to escape the fate of Bonn's Jews, who were being sent to camps, he committed suicide, together with his wife and his sister-in-law. In a farewell letter he sent to a friend, a Jewish lawyer, he explained: "By the time you receive these lines, we three will have solved the problem in another way ... in the way which you have continually attempted to dissuade us ... Forgive us, that we still cause you trouble beyond death; I am convinced that you will do what you are able to do (and which perhaps is not very much). Forgive us also our desertion! We wish you and all our friends will experience better times." Half a year later that lawyer was deported to Theresienstadt and from there to Auschwitz. "What would have happened," wonders Prof. Epple, "had this mathematical flourishing continued in a world without anti-Semitism, without the crimes against humanity committed by the Nazis and their supporters?"

Today, the German Mathematical Society has many Jewish members, though Baer, its president, says he does not know their exact number. "We no longer ask our members to state their religion on the registration forms," he explains.