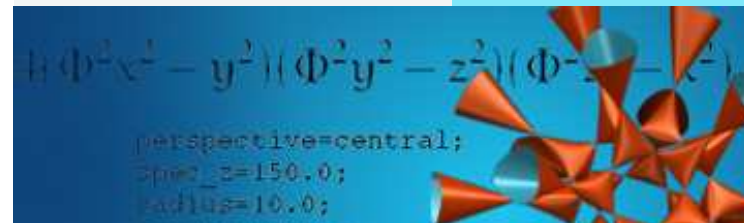


Doing mathematics in Emmy Noether's time: A survey on the study and work situation of women mathematicians in Germany between the two World Wars

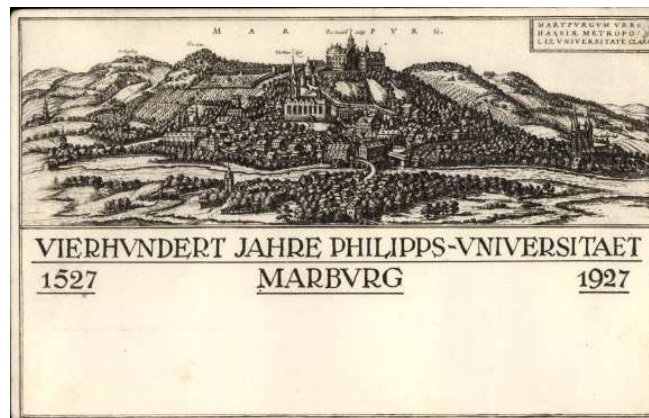
Prof. Dr. habil. Ilka Agricola
Philipps-Universität Marburg



Madrid, April 2019
— a tribute to the 100th anniversary of Noether's habilitation —

What this talk is about. . .

- History of science, because science is done by scientists, so their working and living conditions influence scientific progress
- To be seen in historical context: Industrialisation and wars lead to deep changes in society, the formation of a working class, the need for engineers and other professionals, and sometimes a shortage of male employees
- Partially based on a case study carried out in Marburg (2017/18) about the first generation of female math students in Marburg (see refs.)
- Applies mainly to Germany and, to some extent, neighbouring countries; very different from situation in South Europe and elsewhere



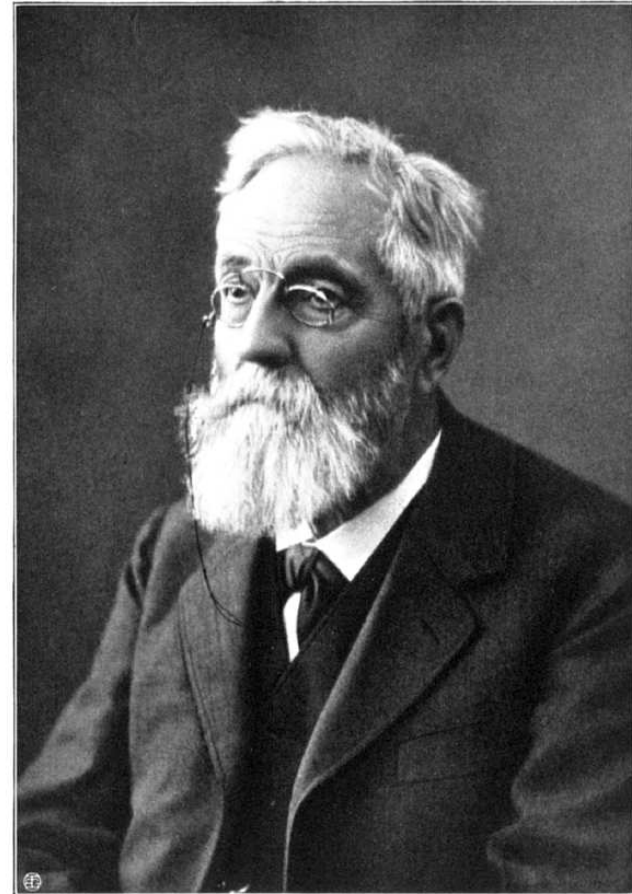
Marburg: An old traditional university



- Founded in 1527 by Philip I, Landgrave of Hesse
- oldest protestant university in the world
- Of relevance for us: As a consequence of the Austro-Prussian War (1866), Marburg and Göttingen became part of Prussia (the Electorate of Hesse and and the Kingdom of Hannover disappeared)
- Hence, Marburg is typical for the development of universities in Germany's largest state – to be honest, they developed much better after 1866. . .

Das 'Mathematisches Seminar'

- Mathematics was taught in Marburg since the foundation of the university 1527 (Papin, Wolff. . .)
- 1817: Foundation of the 'Mathematisch-physikalisches Institut' by Christian Gerling (student of C. F. Gauß)
- 1885: Foudation of the Faculty by H. Weber ('normal subgroups', thm of Kronecker-Weber on algebraic number fields)
- The university had then about 1 000 students, mathematics: 10–30 students. Summer 1904: approx. 75 students.
- Other Math Depts. in Germany were founded around the same time



Phot. W. Weiß, Straßburg i. E.

H. Weber

Emmy Noether (1882-1935)

- Daughter of a wealthy Jewish family in Erlangen
 - Her father Max Noether (1844-1921) was professor of Mathematics in Erlangen and handicapped because of Poliomyelitis
 - Brother: Fritz Noether (1884-1941), professor of Mathematics in Breslau until 1933; emigrated to the Soviet Union, appointed professor in Tomsk and sentenced to death for spying and 'anti-Soviet propaganda' in 1941
- ... her 'success' would have been impossible without several beneficial circumstances, as we shall see



Should women be allowed to study? A controversy

In 1897, prominent German scientists were asked for reports inasmuch they deem women fit for university studies. Some quotes:

„Amazonen sind auf geistigem Gebiet naturwidrig. Bei einzelnen praktischen Aufgaben, z. B. in der Frauenheilkunde, mögen vielleicht die Verhältnisse anders liegen. Im allgemeinen aber kann man nicht stark genug betonen, daß die Natur selbst der Frau ihren Beruf als Mutter und als Hausfrau vorgeschrieben hat, und daß Naturgesetze unter keinen Umständen ohne schwere Schädigungen, welche sich im vorliegenden Fall besonders an dem nachwachsenden Geschlecht zeigen würden, ignoriert werden können.“

Prof. Max Planck (physics), Universität Berlin

„Nach meiner Meinung sollte die Begründung weiblicher Gymnasien aus Gesundheitsgründen ein für allemal verboten werden.“

Prof. Friedrich Stohmann (chemistry), Universität Leipzig

„Nach meiner Meinung sind Frauen zum naturwissenschaftlichen Studium ebenso befähigt, wie Männer. Ich habe in drei Fällen Gelegenheit gehabt, den Studiengang junger Damen zu verfolgen und habe mich überzeugt, daß dieselben an rascher Auffassung und scharfer Beobachtungsgabe in keiner Weise hinter den besseren männlichen Studierenden zurückstehen, dieselben aber häufig an ausdauerndem Fleiß übertreffen.“

Prof. Karl A. von Zittel (geology), Universität München

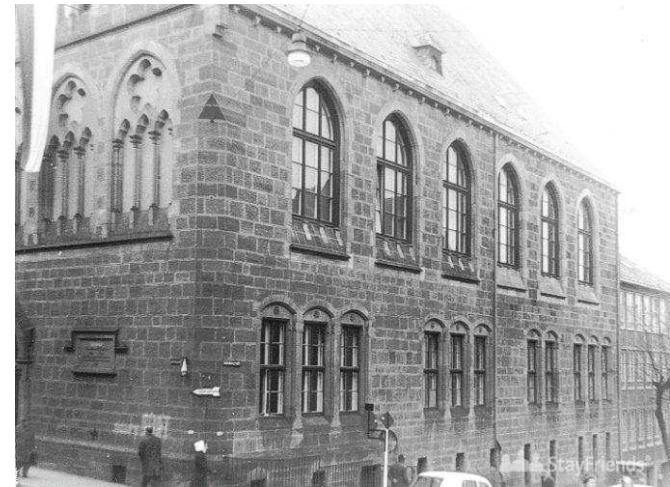
„. . . beispielsweise in diesem Semester nicht weniger als 6 Damen an unseren höheren mathematischen Kursen und Übungen teilnahmen und sich dabei fortgesetzt ihren männlichen Konkurrenten in jeder Hinsicht als gleichwertig erwiesen. Der Natur der Sache nach sind dies einstweilen noch ausschließlich Ausländerinnen: zwei Amerikanerinnen, eine Engländerin, drei Russinnen; — [. . .] dass aber unsere deutschen Damen bei geeigneter Vorbereitung nicht sollten dasselbe leisten können, wird wohl kaum jemand behaupten können.“

Prof. Felix Klein (mathematics), Universität Göttingen

Die akademische Frau – Gutachten hervorragender Universitätsprofessoren, Frauenlehrer und Schriftsteller über die Befähigung der Frau zum wissenschaftlichen Studium und Berufe.
Herausgegeben von Arthur Kirchhoff, Hugo Steinitz Verlag Berlin, 1897.

Access to university: 'Appropriate preparation' – a high school degree (Abitur)

- 1812: Prussia decrees that only a Gymnasium can grant the Abitur, and that it is a necessary requirement for studying
- Since the end of the 18th century, a state examination is necessary to become a teacher at a Gymnasium; the salaries and working conditions are better than at 'ordinary' schools
- High tuition fees prevent children from poor families to attend a Gymnasium
- 1888: Helene Lange (Berlin) starts a petition to grant girls equal access to the Gymnasium
- 1893: The first Gymnasium for girls is founded in Karlsruhe
- 1908: Prussia allows the creation of Gymnasien for girls; however, coeducation becomes normal only after 1968



Gymnasium Philippinum Marburg between the wars

Founded in 1527 for the preparation of future students; girls were admitted only in 1953. For girls, there was a separate school 'for higher daughters' (f. 1879) with a different focus in education.

Emmy Noether's path to university

- 1900: Examination for teacher of French and English at girls' schools (not Gymnasium), then 'guest student' with special permission (of each single professor) in Göttingen.
- 'guest student': Allowed as preparation for the second teaching examination (still not valid at a Gymnasium), but not allowed to take a degree
- 1903: Abitur as an external candidate at 'Königliches Realgymnasium' (first year in which this was allowed in Bavaria). Starts studying in Erlangen.
- 1907 Ph.D. in Erlangen, supervisor: Paul Gordan (second woman ever to get a doctorate in mathematics in Germany)

Because of his illness, Max Noether had had the habit to take his daughter with him to university to assist him; she knew the math professors in Erlangen since childhood, and they knew her; and the family's wealth allowed to pay for private tuition instead of regular high school attendance. Observe that studying was also expensive in these times (tuition + living expenses)

The first generation of female students in Marburg I

18. August 1908, decree of the Prussian minister for education and medicine:

„Mit allerhöchster Ermächtigung habe ich am heutigen Tage die anliegenden Bestimmungen, betreffend die Zulassung der Frauen zum Universitätsstudium, erlassen.“

By this, women were admitted for the first time to Prussian universities. In Marburg, 27 women signed up for the winter term 1908/09.

Among them: Ruth Hensel, daughter of the professor of mathematics Kurt Hensel (advisor of Hasse and Fraenkel – see later)

Slowly, the teaching contents are changed so that attending a girls Gymnasium would be an appropriate preparation for studying



Ruth Hensel (* 1888)

Percentage of female students
until 1918: between 3 and 7 %

The first generation II

- **Social background:** Wealthy families (in poorer families, the studies of sons would typically be given priority), most with academic background (teachers, professors, doctors) or army officers
- **Religious background:** 80 % Protestant, 11 % Catholic, 4 % Jewish.

At a protestant university, this may not come as a surprise. But Catholic students were underrepresented at all universities (German population: 62 % P, 36 % C, 1% J), for male and female students alike (Catholic areas were more rural, poorer, and more sceptical towards higher education)

- Average age higher than for male students (difficult access to Abitur; since 1908, the Abitur could be replaced by at least 3 years of professional experience as a teacher); in fact, only half the female students had an Abitur
- In Mathematics however, the age was similar and more than 90 % had a regular Abitur
- High mobility between universities (typical at these times)

The first generation III – students of mathematics

- 74 women studied mathematics in the first 5 years after 1908. Of these:

17 got a Ph.D. in mathematics, 3 in education, 1 in medicine

one, Marie Vaerting, became a professor of education (see below)

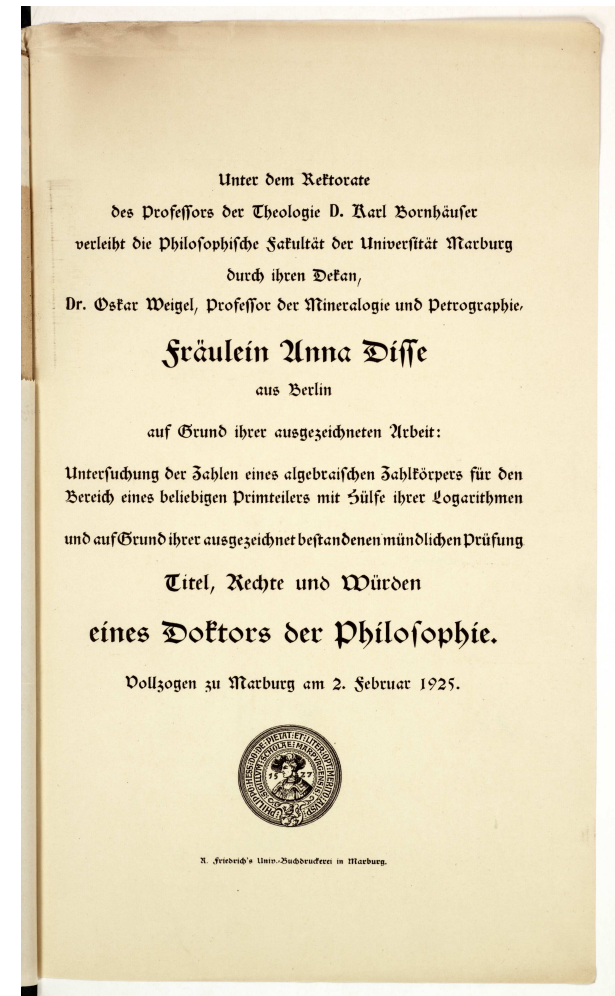
- The first female Ph.D. in Mathematics in Marburg (advisor: Kurt Hensel)

1911: Jessie F. Cameron

1915: Anna Sturmfels

1923: Anna Disse

Of these, only Jessie Cameron worked for some time at a university (Newnham College, Cambridge); the other two became math teachers



Ph.D. certificate of
Anna Disse

An exceptional family: The Vaerting 'girls'

1	2	3		5	6	7	8	9		12	13	14	15		17	18	19
		10	11					16	16								
Lauf. No.	Namen	Tag	Ort	Staats- angehörigkeit	Reli- gion	Stand und Wohnort der Eltern Wohnung des Studierenden in Marburg	Studienfach (bei mehreren Studien- gebieten ist das Haupt- fach zu unterstreichen)	Bezeichnung der Anstalt an welcher das Reifezeugnis erworben ist	Datum des Reife- zeugnisses	Welche Hochschulen sind bereits besucht?	Welche Papiere sind abgegeben?	Tag der Imma- triku- lation	Exma- triku- lation	Be- straft?	Beneficien	Bemerkungen	
25	<i>Peres, Gustav</i>	<i>25/12.88</i>	<i>Milheim a. Salm Pfgr</i>	<i>R.</i>	<i>ev.</i>	<i>Physikwissenschaften Königsplatz 1</i>	<i>Math. u. Phys.</i>	<i>O. R. Pf. Essen</i>	<i>O. 08</i>		<i>Pf., 2. Abt. 9</i>	<i>14. 08 22. 10 09</i>					
26	<i>Vaerting, Mathilde</i>	<i>11. 84</i>	<i>Messingen Gmm.</i>	<i>+</i>	<i>"</i>	<i>F. Raubach zu 16th. Goffstr. 23</i>	<i>Math. u. Nat.</i>	<i>G. Weibler</i>	<i>G. 07</i>	<i>Bonn München</i>	<i>Pf., 2. Abt. 9</i>	<i>" 2. 4. 08</i>					
27	<i>Vaerting, Maria</i>	<i>25/1. 80</i>	<i>Messingen Gmm.</i>	<i>+</i>	<i>"</i>	<i>F. Raubach Goffstr. 23</i>	<i>Mathem.</i>	<i>Anal. Sacken</i>	<i>O. 08</i>	<i>Bonn</i>	<i>Pf., 2. Jährh.</i>	<i>" 2. 4. 08</i>					

Immatriculation of Marie (1880-1964) and Mathilde (1884-1977) Vaerting

- 10 siblings (8 girls, 2 boys) from a rich Catholic family of farmers, of which 7 got a Ph.D; both parents died early, hence the eldest daughter Marie Vaerting took care of her younger siblings. They had a private teacher.
- Marie Vaerting moved later to Bonn. After her advisor accepted a position in Prague, she moved with the younger siblings to Gießen to finish her Ph.D. in 1910 with Moritz Pasch. Shortly after, she married and became a writer. Her autobiography is a rich source for the study conditions of women.

- Mathilde Vaerting got her Ph.D. in Bonn in 1911, her teachers' certificate in 1912
- Started teaching mathematics and physics at a girls' Gymnasium in Berlin-Neukölln
- 1919: Submitted a habilitation thesis on mathematics teaching to Berlin university, which was rejected; nevertheless, it became rather popular
- 1923: The socialdemocratic minister of Education in Thüringen, Max Richard Greil, appointed her professor in Jena (against the will of the Faculty). After Margarete von Wrangell (biology, Univ. Hohenheim, 1923) she was the second woman to be appointed professor in all of Germany!
- 1933: The Rector of the University of Jena requested her dismissal because 'her appointment and her behaviour indicates that she does not back the national state'. Although she was not member of any political party, she was suspected to be a socialdemocrat.
- After 1945, she was not appointed again and did not work any further at a university.

Obtaining a Habilitation

The problems of Marie Vaerting were typical. In the same year when studying was *allowed* for women, obtaining a habilitation was *forbidden* by another law.

- Emmy Noether: Submitted her habilitation in 1915. Although the Faculty wrote several letters to obtain a unique special permission, it was declined in 1917. She announced her lectures under Hilbert's name.

- After WWI, the law was abolished and Emmy Noether received her degree

Hence, it becomes clear that the table could not have started any earlier

- Received her first salary in 1923! Before, she lived modestly on her heritage

Math Habilitations of women in Germany

1919	Emmy Noether
1927	Hilda Pollaczek-Geiringer
1936	Ruth Moufang – 1st prof.
1940	Hel Braun – studied in MR
1942	Maria-Pia Gepert
1945	Erna Weber
1954	Maria Hasse
1959	Sigrid Becken
1967	Sybilla Crampe-Prieß
1970	Marianne Reichert
1971	Judita Cofman
1971	Irene Pieper-Seier
1972	Helga Bunke
...	...
2018	around 200

Student life between the Wars

A German peculiarity:

Burschenschaften! (student fraternities — all male student associations)

Founded around 1813, they used to be liberal in these times, but now they are mostly nationalistic and even antidemocratic.

Around 1920, they were still very popular, with a large number of members.

- Marburg: Math tutorials, the student library, and advanced talks were organised until 1945 in the „Mathematisch-physikalischer Verein Markomannia“ → female students did not have access to them



The University prison – in use (with breaks) until 1945. Getting arrested at least once was a matter of honour for fraternity members. The walls are covered with their signs.

Why Emmy Noether did not become Germany's first female math professor

In these times, professorships were not publicly advertised—the community was tiny, so everybody „knew“ who was looking for a job. The Faculty prepared a short list of names to be presented to the minister for appointment.

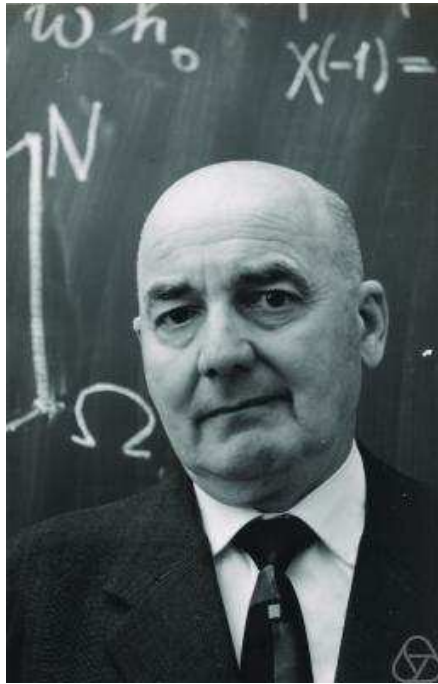
Of course, this made the procedure rather intransparent.

- University Kiel, October 1928: Ernst Steinitz (1871-1928), one of the founders of the modern theory of fields, dies rather unexpectedly. His colleague Abraham Halevi Fraenkel (1891-1965) starts preparing the short list.

With her strong work on abstract algebra, Emmy Noether is a canonical candidate—she is ‘available’ and she fulfills all formal requirements.

Happily for research, an extended mail exchange with Helmut Hasse about the topic is available. Both were students of Kurt Hensel, obtained their Ph.D.s in Marburg.

Fraenkel always said in public that he found the treatment of Emmy Noether unjust, Hasse was considered to be a close friend of hers. *What went wrong?*



Helmut Hasse



Abraham Fraenkel

- Fraenkel: From a Jewish-orthodox family, soldier in WW I, fervent Zionist, moved to Jerusalem in 1931; second rector of the University of Jerusalem
- Hasse: Son of a judge, soldier in WW I, rather nationalistic, applied for membership in the Nazi Party in 1937, but this was denied to him due to his Jewish ancestry; successor of Hensel in Marburg, later professor in Göttingen, Berlin, and Hamburg

The mail exchange Hasse-Fraenkel

F to H, 8.10.1928: „Frl. Noether. That she would be professor since long when a man despite her **poor teaching** goes without saying. I think that working with her would be rather **unpleasant**.“

H to F, 10.10.1928: „I am surprised that you even consider Frl. Noether. Despite all her scientific achievements, I find her completely unfit to be full professor, and even more at a small university like Kiel. She only fits a large university where she would never have to teach beginners. Also, I think that **the experiment to make a woman full professor** should not be carried out at a place like Kiel.“

F to H, 14.10.1928: „I find your comments on Frl. Noether encouraging not to put her on the [short] list.“

This goes on for a while, until both happily agree that she could not be appointed (in the end, the position went to Th. Kaluza). Mitigating circumstances about her difficult career path were not taken into account.

Presumably, many hiring committees solved the ‘problem’ not to appoint Emmy Noether in a similar way (‘in principle yes, but not *here*. . .’).

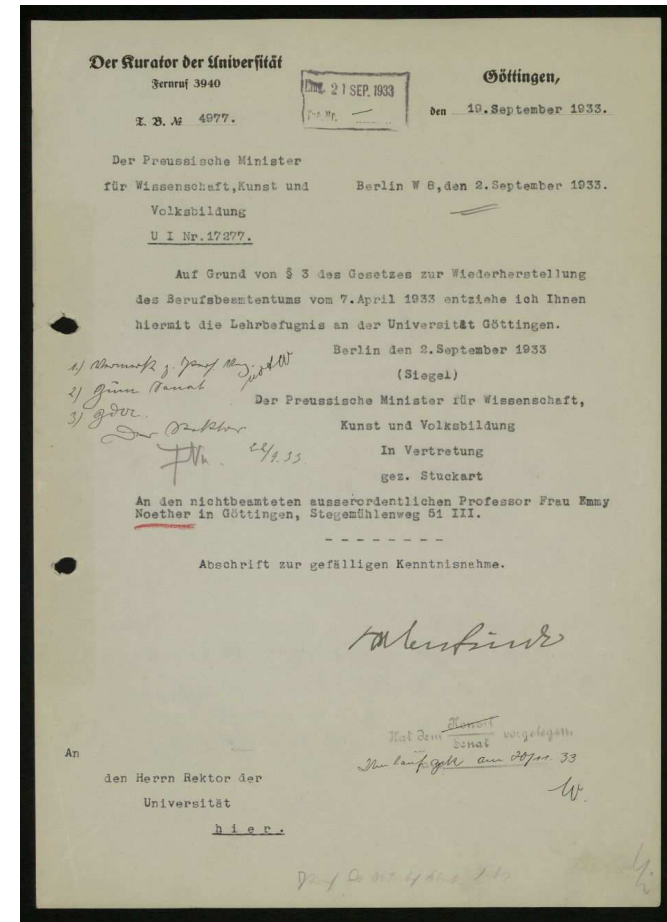
The dismissal of Emmy Noether in 1933

In 1933, the Nazis passed a law that allowed to fire all unwanted civil servants—a very effective tool for Nazification

It hit mostly Jews, members of the communist or socialdemocratic parties, personal enemies, and anybody considered to be unreliable—like working women

Emmy Noether fulfilled several of these conditions: Of Jewish origin, a dedicated pacifist, 1918-1924 member of the socialdemocratic party.

She was dismissed in September, emigrated to the US (but obtained only a guest professorship at Bryn Mawr College), and died there after some surgery in April 1935.

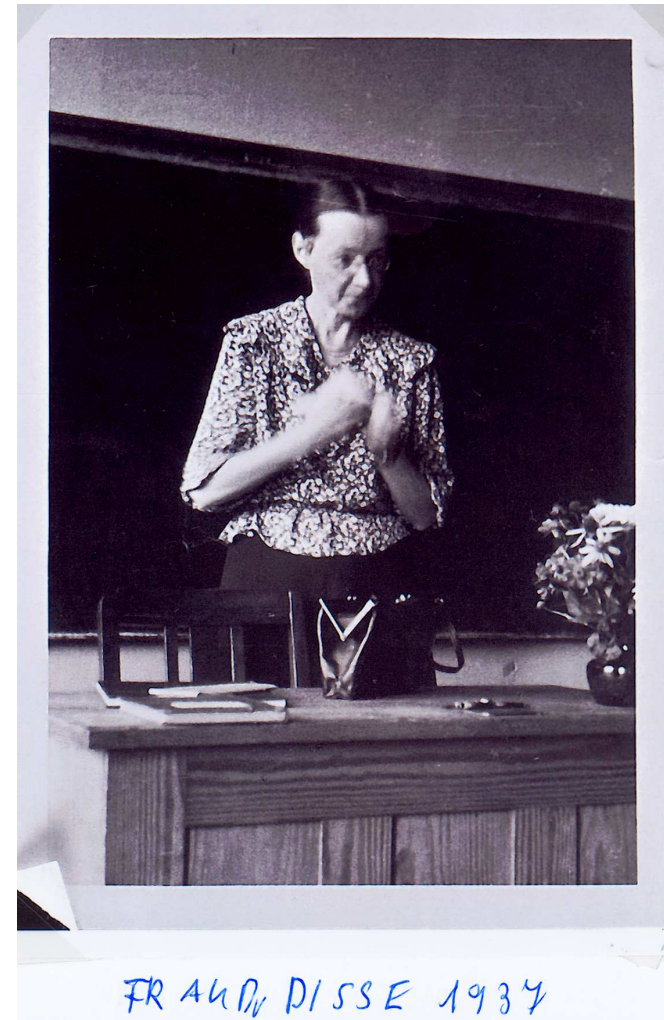


Letter informing E. Noether about her dismissal

Being a teacher: The career of Anna Disse (1889-1975)

- Daughter of a professor of medicine in Marburg
- worked already as a teacher 1905-1908
- 1909: Prepares the external Abitur with the help of a private teacher
- Studies in MR 1909-1912, advanced teachers' exam 1913, works at the Kippenberg-Gymnasium (Bremen) until her retirement
- Publishes many books on math education

She is a typical example of the 'single female teacher' ('Fräulein Lehrerin'), a very popular figure in German society (virtually everybody knows one)



FRÄULEIN DISSE 1937

Anna Disse in 1937

A German peculiarity (1880-1957)

- By law (~ 1880), female teachers were NOT allowed to marry! In some places, this was extended to *all* civil servants ('Lehrerinnenzölibat')
- By marriage, a woman lost her position and all retirement payments
- In general: women needed a work permission of their husbands until 1977, were allowed to have their own bank account only in 1962

Hence, all female students listed here had to choose sooner or later.

- The law was abolished 1918-1923, but reintroduced in times of raising unemployment rates. Female teachers were paid less, and had to pay higher taxes
- Exceptions were only allowed at places with a shortage of teachers or during the 2nd World War
- 1950-57: Dismissal is not automatic anymore, but checks first whether the husband earns enough to care for a family
- 1957: The law is abolished

Comments on competition

A recurring theme in all documents is the implicit and explicit competition between men and women for the same jobs—because of their limited number, their social status and relatively high income, but also the ensuing changes for society

Observation: The right to get an Abitur / to study is incomplete without adequate job opportunities after graduation

- There was a fierce opposition against women becoming teachers at a Gymnasium—by the male colleagues
- For women of the working class, there was no question whether working and having a family were compatible—salaries were too low for anything else
- The ideals of the middle class were different: a good family father had to be able to support a family, a good mother cared for house and children
- Whenever real life did not match the ideal picture, exceptions were made—and suppressed again as soon as possible

→ some laws can only be understood in this historical context

The 'Noether Lounge' in Göttingen

Surprisingly, Emmy Noether was long completely forgotten in Göttingen.

1984: Samuel Patterson proposed to transform the former custodian's apartment in the basement into a faculty lounge, and the American guest professor John McCleary proposed to name it after E. Noether (and donated the picture on the wall).

This reflects that Emmy Noether was, in these times, more popular in the US than in Germany.

Now: A prestigious grant, a professorship, and a plenary lecture at the DMV Annual Meeting are named after her.



Foto: Katharina Habermann



Gallery of former professors
of mathematics in Marburg



View of the Old University
from the river Lahn

THANK YOU FOR LISTENING!

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