

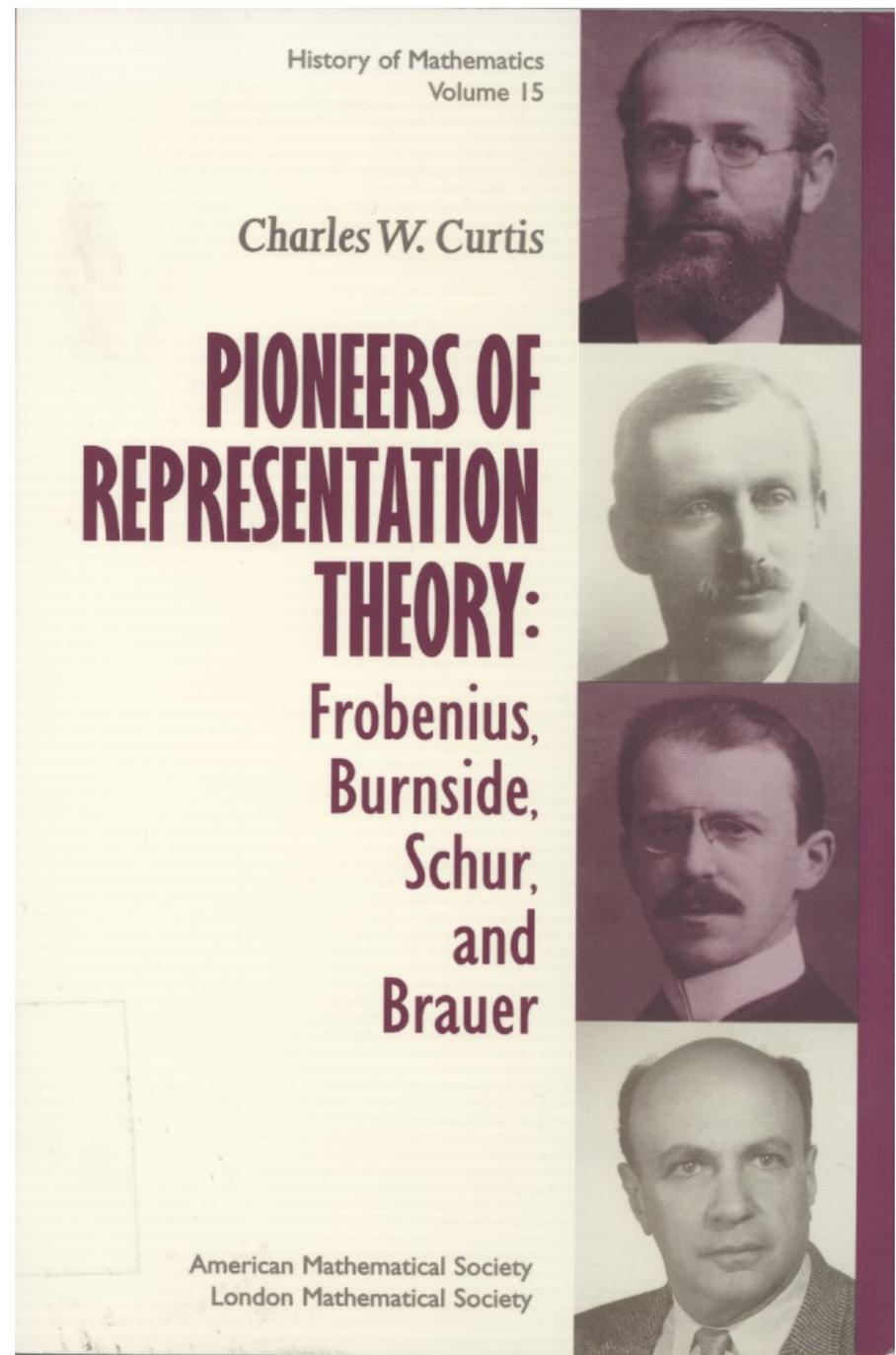
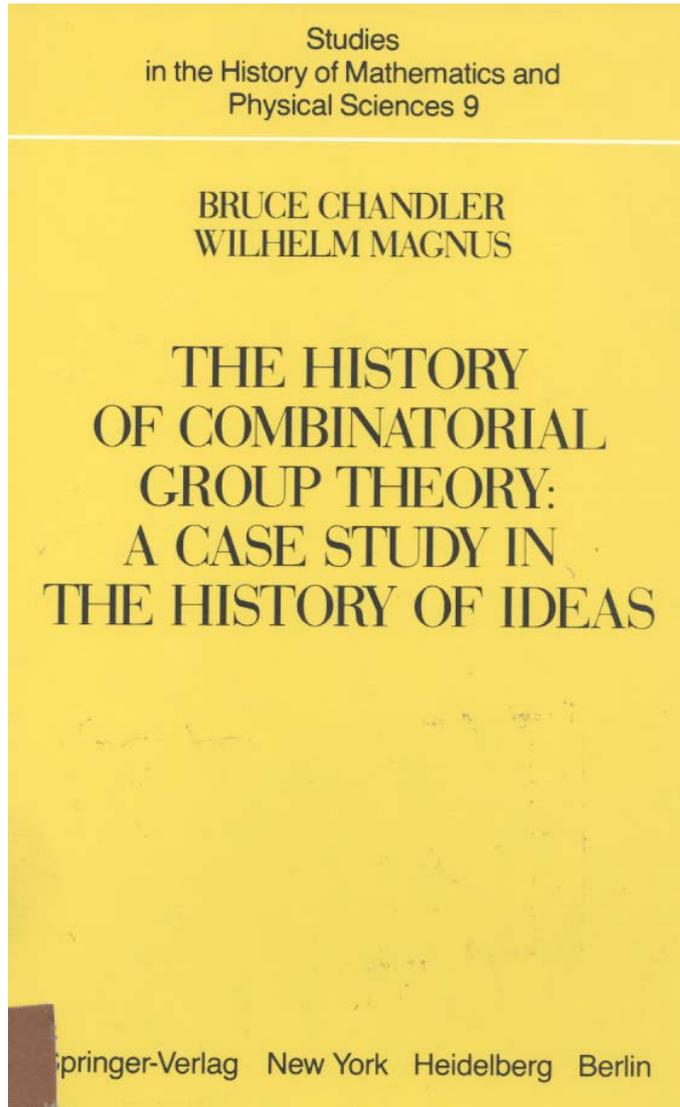
Issai Schur and his algebraic school in Berlin:
known and unknown historical documents,
with emphasis on persecution in the Third
Reich

Reinhard Siegmund-Schultze

(University of Agder, Kristiansand, Norway)

University of Bielefeld, 8/9 November 2013

Publications about the Schur School
from 1982 (left) and 1999.



Band 16



G. Herglotz · I. Schur · G. Pick ·
R. Nevanlinna · H. Weyl

Ausgewählte Arbeiten zu den Ursprüngen der Schur-Analysis

Gewidmet dem großen Mathematiker
ISSAI SCHUR (1875–1941)

**Teubner-Archiv
zur Mathematik**

German edition by B. Fritzsche
und B. Kirstein about Schur's and
his predecessors' and successors'
work in «Schur Analysis» (Leipzig
1992).

Contains also a reprint of Walter
Ledermann's report on «Issai
Schur and his school in Berlin»
from the *Bulletin of the London
Mathematical Society* 1983



Persecution and Expulsion
of Mathematicians from Berlin
between 1933 and 1945

An Exhibition
on the Occasion of the
International Congress of Mathematicians 1998

Deutsche Mathematiker-Vereinigung



The young Issai Schur

6. Schur's school in Berlin

There is no obvious way in which the "school" of a mathematician can be defined. In contrast to many sciences, little or no team work is involved in mathematics apart from some joint papers, usually written by two authors.

I think a simple but rather narrow definition of "school" would be to restrict membership to those who took their Ph.D. under Schur's guidance. This is only a first approximation, for there are mathematicians who went to Schur's lectures and seminars in Berlin and were strongly influenced by him although they did not become his doctoral students.

Fortunately, the editors of Schur's Collected Works have appended a list of Schur's Ph.D. students together with the titles of their dissertations. There are 22 persons who completed their dissertations under Schur, covering the period 1917 to 1936, and 6 others who started under Schur but did not complete their work until after Schur's dismissal in 1936.

Schur's Ph.D. students

1917	Maria VERBEEK	1928	Arnold SCHOLZ
1921	Heinz KRÜFER	1931	Robert FRUCHT
1921	Arthur COHN	1932	Wilhelm SPECHT
1922	Dora PROLSZ	1932	Bernhard NEUMANN
1922	Felix POLLACZEK	1932	Hans ROHRBACH
1923	Mazmmina HERZBERGER	1933	Richard RADO
1924	Höfstadt ILLE	1933	Wolfgang HAHN
1925	Karl DÖRGE	1935	Helmut WIELANDT
1926	Richard BRAUER	1935	Karl MOlsen
1928	Liso WEGNER	1936	Rose PELTESOHN
1928	Alfred BRAUER	1936	Fredor THEILHEIMER

[Quoted with the publisher's permission from ISSAI SCHUR, *Gesammelte Abhandlungen* (Edited by Alfred Brauer and Haas Rohrbach), Vol. III (Springer-Verlag, Berlin, 1973), pp. 479-480.]

The School of Issai Schur

Until 1933 the algebraic school of Issai Schur (1875-1941) at the University of Berlin was, without any doubt, the single most coherent and influential group of mathematicians in Berlin and among the most important in all of Germany. Inspired by a charismatic leader, it centered around Schur's research on group representations, which was extended by his students in various directions (soluble groups, combinatorics, matrix theory). [Cha/Mag 1982] Eleven out of the 44 exiled Berlin mathematicians were Schur's students. Several of them (Pollaczek, Schiffer, and Theilheimer) later turned to more applied fields, partly influenced by the deep connections of Schur's work with mathematical physics. Another student, Robert Frucht, went to Italy already in 1930 for economic reasons, and had to move again, this time to Chile, when the racial laws came into effect in Italy in 1938; Frucht became a noted graph theorist [Fru 1982].

The fate of several others of Schur's students (Arthur Cohn, Rose Peltsohn) is still unclear. Leading mathematicians outside Berlin like Hermann Weyl in Göttingen and Richard Brauer, who had left Berlin for Königsberg in 1925, were strongly influenced by Schur. Nevertheless, the work of Schur's group was somewhat overshadowed in its international recognition by the more abstract school around Emmy Noether in Göttingen, but their ideas merged in the

subsequent development of the field. [Led 1983], [Bier 1988], [Fe 1980], [Schi 1986], [Jes 1993], [Ding 1945]

Emigrated Students of Issai Schur



Alfred Brauer

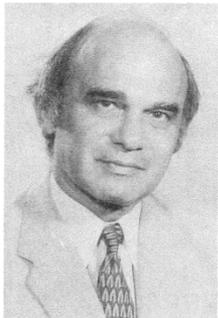
Alfred Brauer (1894-1985), brother of the younger but better known Richard Brauer, was one of the organizers of the *Mathematisch-Physikalische Arbeitsgemeinschaft (Mapha)* until 1933; he also took



Käte Sperling-Fenchel



Kurt August Hirsch



Walter Ledermann



Bernhard Neumann

care of the library at the mathematical institute. He was dismissed as a *Privatdozent* in 1935 and left for the United States in 1938. There he became an assistant to Hermann Weyl at the Institute for Advanced Study, and his experience with the mathematical library in Berlin became valuable for the building of the Institute's new library. Eventually, he became a professor at the University of North Carolina at Chapel Hill. He worked extensively on characteristic roots of matrices and co-edited Schur's "Gesammelte Abhandlungen" in 1973. [Roh 1988] In a letter of Hermann Weyl to Paul Bernays from 1940 we read: "Alfred Brauer is my assistant, and he is proving very helpful in the building up of a new library ... in our new quarters called Fuld Hall." [Weyl Papers]

Käte Fenchel (born Sperling, 1905–1983) was Schur's student from 1924 to 1928. She finished her studies with a *Staatsexamen* (high school teacher's diploma), since she could not afford to continue her studies. In 1933 she was dismissed as a teacher and was forced to emigrate to Denmark (see Posters 18 and 21). [Hoy 1987]

Kurt August Hirsch (1906–1986) was Schur's student although eventually he chose a dissertation on the foundations of mathematics which was supervised by Bieberbach (1933). In order to earn a living Hirsch went into journalism around 1930. He started writing about mathematical or philosophical matters in one of the oldest daily papers in Europe, the *Vossische Zeitung*. When the newspaper folded up in March 1934, Hirsch went to Cambridge, England. He returned to algebra there and made seminal contributions to the theory of soluble groups. In 1951, he moved to the University of London where he built an important centre for group theory. (See Poster 24) [Hir 1986] [Gru 1988]

Walter Ledermann (born 1911) completed a *Staatsexamen* in November 1933 "with Issai Schur as examiner and L. Bieberbach (in Nazi uniform) as co-examiner." [letter 1] In early 1934 he obtained a scholarship to St. Andrews in Scotland through the *International Student Service (Weltstudentenwerk)*. In 1936 he received his Ph.D. under H.W. Turnbull. He held teaching appointments at various British universities and retired from Sussex in 1978. His mathematical research interests include matrix theory, statistics, and homological algebra among others; like his teacher Schur he always preferred concrete problems. He has written an authoritative historical report on the "Schur School" [Led 1983], [Gai/Laf 1985], [letter 1]

Bernhard Neumann (born 1909) took his doctorate with Schur in 1932. He had to leave Berlin in 1933 and earned a second doctorate in Cambridge (England) under the supervision of Philip Hall. Together with his wife Hanna (born von Caemmerer, see below) he went to Australia in 1962 to build a modern mathematical institute in Canberra. He made important contributions to modern combinatorial group theory, especially in the area of free products of groups and embedding theory. In 1992 he was awarded an honorary doctorate by the Humboldt-Universität Berlin. [Pi/Fu 1973]

Hanna Neumann (born von Caemmerer, 1914–1971) completed her teachers diploma in 1936. She left Berlin first for Göttingen and in 1938 went to Cambridge (England) to marry Bernhard Neumann (see Poster 20). She was mother to five children, among them the well-known mathematicians Peter and Walter D. Neumann. Her publications include the monograph *Varieties of Groups* (1967). [New/Wa 1974]



Hanna Neumann



Felix Pollaczek



Richard Rado



Menahem Max Schiffer

Rose Peltesso (born 1913) was one of the last doctorate students of Schur's (1936), working on the combinatorial question "Das Turnierproblem für Spiele zu je dreien". Before emigrating to Palestine in 1938 she wrote another paper on an algebraic subject, published in *Compositio Mathematica*. Her two papers have attracted considerable attention during several decades. Peltesso is now living in Tel Aviv. [Pi/Fu 1973]

Felix Pollaczek (1892–1981) received his doctorate from Schur in 1922. He left academic life to join the industrial company AEG. In 1923 he became scientific adviser at the *Reichspost-Zentralamt* in Berlin. Pollaczek made important contributions to stochastics (queueing theory) and applied mathematics. He escaped to southern France in 1933 and managed to survive with the help of French peasants. (See Poster 16) [Schrei/LeGall 1993]

Richard Rado (1906–1989) went to England in 1933 immediately after receiving his doctorate from Schur and earned a second Ph.D. under G.H. Hardy in Cambridge in 1935. In 1954 he became a professor at the University of Reading (England). Rado had extremely wide mathematical interests. His most important work is in combinatorics, partly in cooperation with Paul Erdős. In 1981 Rado received an honorary doctorate from the Freie Universität Berlin, and in 1998 the Fachgruppe Diskrete Mathematik der DMV set up an annual Rado Prize for talented young mathematicians. [Rog 1991]

Menahem Max Schiffer (1911–1997) was originally a student of physics (with Schrödinger) and turned to algebra and invariant theory under the influence of Schur. In 1933 he could not submit his dissertation (a paper which "Schur liked very much") because Schur was then (temporarily) dismissed. Instead he was offered a scholarship to the Hebrew University in Jerusalem by an official of the English-Jewish Emergency Council, whom he met by chance

in Schur's home. Schiffer later changed his field of interest to Riemann surfaces and differential equations. In 1946 he went to the United States and became an influential mathematician at Stanford University. [Schi 1986]

The ordeal of Issai Schur (1875–1941)

Of all professors of mathematics Issai Schur had the oldest connections to the University. Schur had been a student of the famous algebraist Georg Frobenius (1849–1917) and was admitted as a *Privatdozent* in 1903. He was born in Mogilev on the Dniepr, but he spoke German so perfectly that no one could guess that it was not his native language. His emotional ties to Germany were so strong, that when the Nazis came to power in 1933, he declined many cordial invitations to continue his life and work in the United States or in Britain. He endured six years of persecution and humiliation under the Nazis. Eventually, in order to be allowed to leave the country, he even had to find a sponsor to pay the *Reichsfluchtsteuer* (Reichs flight tax). A sick man in body and spirit, he finally reached Palestine and died there two years later on his 66th birthday on January 10, 1941. [Bra 1973]

Walter Ledermann describes Schur's teaching: "Schur was a superb lecturer. His lectures were meticulously prepared. ... (and) were exceedingly popular. I remember attending his algebra course which was held in a lecture theatre filled with about 400 students. Sometimes, when I had to be content with a seat at the back of the lecture theatre, I used a pair of opera glasses to get at least a glimpse of the speaker." [Led 1983; 105]

Progress in Mathematics

Studies in Memory of Issai Schur

Anthony Joseph
Anna Melnikov
Rudolf Rentschler
Editors



Birkhäuser

Edition from 2003, containing, among other things:

Walter Ledermann and Peter M. Neumann:

«The Life of Issai Schur through Letters and other Documents»

This contribution has a translation of **Alfred Brauer's German «Gedenkrede auf Issai Schur»** in Schur's **«Gesammelte Abhandlungen»** from 1973

Students of Schur

The names of the students who completed their doctorate under Schur given below are reproduced from pages 479–480 of volume 3 of A. Brauer and H. Rohrbach (eds.), I. Schur, *Gesammelte Abhandlungen* (Berlin, 1973), as well as a further list of those who started their studies with Schur but did not continue under him on account of the troubles of that time.

Schur's Ph.D. students:

1917	Maria VERBEEK	1928	Arnold SCHOLZ
1921	Heinz PRÜFER	1931	Robert FRUCHT
1921	Arthur COHN	1932	Wilhelm SPECHT
1922	Dora PRÖLSZ	1932	Bernhard NEUMANN
1922	Felix POLLACZEK	1932	Hans ROHRBACH
1923	Maximilian HERZBERGER	1933	Richard RADO
1924	Hildegard ILLE	1933	Wolfgang HAHN
1925	Karl DÖRGE	1935	Helmut WIELANDT
1926	Richard BRAUER	1935	Karl MOLSEN
1928	Udo WEGNER	1936	Rose PELTENSOHN
1928	Alfred BRAUER	1936	Feodor THEILHEIMER

Typo:
Peltessohn

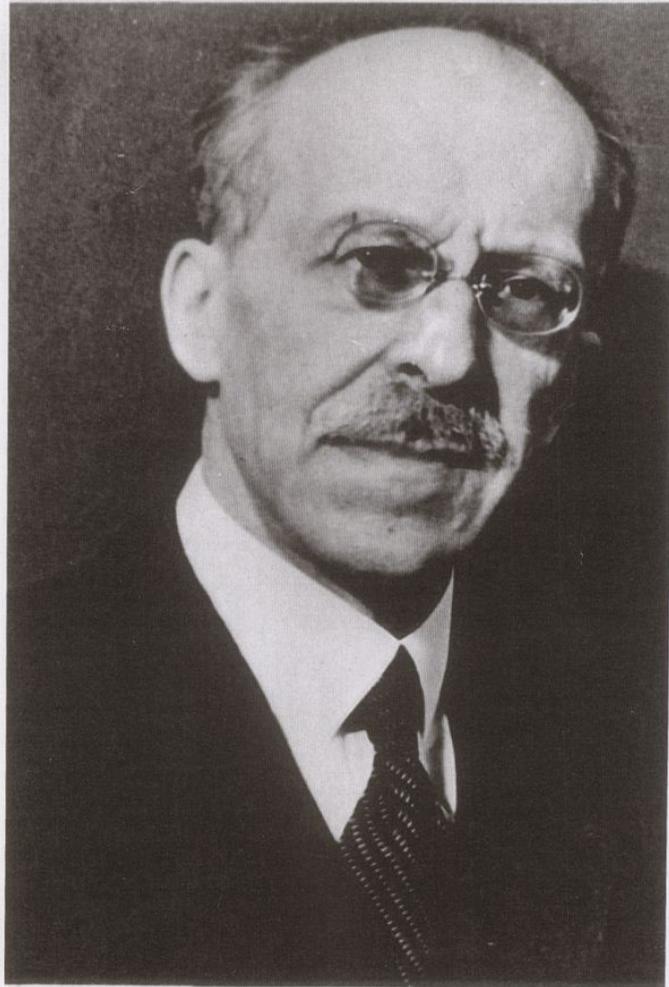


The students who started their studies with Schur:

Kurt HIRSCH	Walter LEDERMANN	Menahem Max SCHIFFER
Lev KALUZNIN	Hanna NEUMANN	Isaac SCHOENBERG

Rehovot, 25 March 2002.

Anthony Joseph and Anna Melnikov



I. Schur

Short biography of Issai Schur:

Born 10 January 1875 in Mogilev, Russian Empire (now Belarus)

1894 Schur enters the University of Berlin

1901 Schur takes doctorate with Frobenius, with whom he publishes on group representation theory in 1906

1913 assistant professor in Bonn

1916 back in Berlin, from 1919 as full professor

1933 temporarily dismissed

1935 permanently dismissed (officially emeritus)

1939 emigration to Palestine (now Israel) through Switzerland

Died 10 January 1941 in Tel Aviv



Frobenius

1849-1917

Leading German algebraist.

Supervisor for PhD both Landau and Schur. Collaborated with the latter.

Frobenius' draft of a faculty proposal in Berlin 1917 discussing possible successors to Hermann Amandus Schwarz:

„Landau and Schur are the best scholars that have originated from the school of Mr Frobenius over the past 25 years. [...] **But the versatile Schur compares to Landau like a genius to a talent.** Among Schur's works are many of highest value. **The majority of Landau's works, as interesting as they are now, would lose their value on the day when a certain conjecture of Riemann is fully proven.** [...] In consideration of all these circumstances the Faculty cannot think about proposing Landau as ordinary professor at a university where Schur [...] is unfortunately still merely an extraordinary professor.“

Given the fact that the “certain conjecture of Riemann” is even today, in 2013, unproven and given that Landau was highly appreciated by foreigners such as the Englishman G. H. Hardy and the Dane H. Bohr and later would have influential students as well, the faculty’s proposal is clearly recognisable as an emotional statement, strongly coloured by Frobenius’ self-interest.

Frobenius’ self-centered «tact» and sympathy for his preferred student Schur had also proved itself four years before, when he counselled the Swiss ministerial official («Schulrat») on an appointment which Hermann Weyl (1885-1955) finally got:

“I do not even recommend to you Prof. J. Schur (now in Bonn). He is much too good for Zurich. He shall become my successor in Berlin one day. Among the younger, Bieberbach (currently in Basel) is the most important. ... If you appoint Weyl, it will be an excellent choice.”

Landau and Schur – Documents of a Friendship until Death in an Age of Inhumanity¹

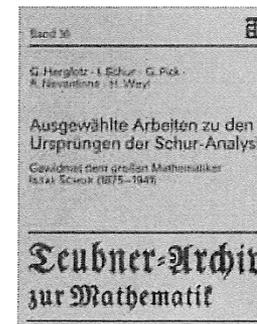
Reinhard Siegmund-Schultze (Norway)

In the following we want to bring to mind two important German-Jewish mathematicians, Edmund Landau (1877–1938) and Issai Schur (1875–1941).² They were close friends of about the same age and they were both students of Georg Frobenius (1849–1917) in Berlin around 1900.

During their careers they went into quite distinct mathematical topics and worked at the two leading German (Prussian) universities, in Göttingen and Berlin. Together with their students such as Carl Ludwig Siegel and Hans Heilbronn (of Landau) and Richard Brauer (of Schur),³ many of whom were persecuted by National Socialism, they have shaped a considerable part of world mathematics, particularly in algebra, number theory and function theory. The two mathematicians have been honoured with the publication of Collected Works. While Landau focused on analytic number theory, and Schur on group representations, they both contributed specifically to complex function theory. In Schur's case his contribution has become known as "Schur Analysis".



EDMUND LANDAU



Left: Edmund Landau (Acta Mathematica 1882–1912, Table générale des tomes 1–35, S. 154)

Middle: Issai Schur (portrait collection Mathematical Research Institute Oberwolfach)

Right: Schur Analysis, edited by B. Fritzsche and B. Kirstein with Teubner in Stuttgart and Leipzig, 1991

ably due to the extreme conditions of their last years of life that no correspondence between Landau and Schur, which undoubtedly must have existed, seems to have survived.

Alfred Brauer (1973) on Schur's marriage to Regina Frumkin, physician, in 1906:

„There were two children of this marriage, a son, to whom he gave the first name GEORG in honour of FROBENIUS and a daughter HILDE. SCHUR would have been pleased if his son had studied mathematics, for which he was very gifted. But his son preferred to study physics in order to avoid competition with his father. He passed the State Examination, but then had to abandon his studies because of his emigration. In later years he worked as an actuary in Israel. Israel's National Insurance is based on his calculations.»

MATHEMATISCHE ZEITSCHRIFT

UNTER STÄNDIGER MITWIRKUNG

VON

K. KNOPP
BERLIN

E. SCHMIDT
BERLIN

I. SCHUR
BERLIN

HERAUSGEGEBEN

VON

L. LICHTENSTEIN
BERLIN

WISSENSCHAFTLICHER BEIRAT.

W. BLASCHKE L. FEJÉR G. HERGLOTZ A. KNESER E. LANDAU
O. PERRON F. SCHUR E. STUDY H. WEYL

1. BAND



BERLIN
VERLAG VON JULIUS SPRINGER
1918

In a letter dated August 7, 1919 to G. Pólya, the co-editor of that journal, Issai Schur, comments on Pólya's critical letter about Richard von Mises' recent MZ-article on the foundations of probability. Schur, who was to become von Mises' colleague in Berlin six months later, wrote to Pólya:

“It is a pity that it is improper to confront him with the passage of your letter which comments on his work. This would do him good given his ego. I do not understand very much of probability theory. But one thing I can see: your remarks as well as your note in the *Astronomische Nachrichten* are very subtle [fein].”

Walter Ledermann (1911-2009) on his time as a student at Berlin University 1928-1933 (on website St. Andrews University <http://www-history.mcs.st-and.ac.uk>)

“The person who had by far the strongest influence on my career was Issai Schur, the Ordinarius for Algebra. He was a superb lecturer. His courses were extremely well structured and organized: they were divided into chapters and subsection, each with a separate number. He prepared his lectures so well that he delivered them without recourse to the notes, which, as I learned later, he carried in the pocket of his jacket. Schur's lectures were very popular. **His introductory courses on algebra were attended by about 300 students.** On some days I was able only to secure a seat in one of the back rows and had to use opera glasses in order to read his writing on the black board. I felt that Schur's lectures were perfect in form and content. I took rough notes of what he said during the lectures and later, during week-ends or vacations. **I transcribed them into cloth-bound books. They comprise some 2000 pages of about 320 lectures given by Schur on various branches of algebra and number theory.** I greatly treasured these hand-written books as a monument of Schur's supreme knowledge and wisdom and I frequently referred to them throughout my career....”

Schur on ‚abstract algebra‘ and growing abstraction in general

Ledermann in „Studies in Memory of Issai Schur“ (2003)

„It has been said that Schur did not like the trend towards abstraction in algebra that was developed by Emmy Noether and her school in the 1920's and 1930's and which was brilliantly expounded in van der Waerden's *Moderne Algebra*. For example, as far as I can remember, in all his lectures on algebra Schur never used the term "vector space." ... I certainly dislike abstraction for its own sake; for I am of the opinion that in mathematics we should do things and not just talk about them. ...

He (Heinz Hopf) spoke to me about his years in Berlin, when I was his student. One of the outstanding events in the history of algebra was the publication of van der Waerden's book *Moderne Algebra* which brought about a strong tendency towards abstraction. Some of the younger members of the Faculty, including Hopf, thought it would be a good idea to hold a weekly seminar in which van der Waerden's book could be studied by all the members. But the academic etiquette in those days required that such a seminar could take place only with the permission of Issai Schur, who was the Professor of Algebra. There was a belief that Schur did not like abstract algebra and might therefore not approve of this seminar. So Hopf's colleagues said to him: "You are polite and well dressed (which some of the others were not). Go to Schur on our behalf and asked him for permission to run the seminar." Hopf had an interview with Schur, who readily gave his approval but added: "I shall not take part."

Schur in a letter of 1929 to a commission in Zurich for the successor of Hermann Weyl at ETH – in the end topologist Heinz Hopf from Berlin was selected:

„Recently a very gifted young mathematician (H. Freudenthal) has finished his Ph.D.. From many conversations with him I know that Hopf does not deal with abstract generalities, but is always concerned applying the beautiful results of modern topology (neue Topologie) on analytical problems. He is also versed in analysis and theoretical physics. Recently he gave lectures on function theory.”

The year 1933: Excerpts from von Mises' personal diaries

17. [March 1933] Berlin

Vormittags im Inst., in der Bank, beim Photogr. Schlechte Stimmung, ernstliche Befürchtungen einer sehr schlechten Wendung aller persönlichen Verhältnisse. Am Abend ausführlich mit Testament beschäftigt.

In the morning in the Institute In bad mood, serious concern about a dramatic change of personal conditions. In the evening worked on my will.

18.

Vormittags etwas weiter am Ms. gearbeitet. Dann mit Sekretärin R[ilke]-Herausgabe gearbeitet. ... Dann bei Schur. Mit Lichtenstein zusammen, ganz nett. Die Stimmung sehr gedrückt.

In the morning worked on ms. ... Then with Schur and with Lichtenstein, quite nice. Mood very depressed.

[Note as background burning of Reichstag 27./28. February, NSDAP since elections 5 March mit nationalist DNVP absolute majority, Hitler's ‚Ermächtigungsgesetz‘ (Enabling Act) 24 March 1933]

Law for the Restoration of the Professional Civil Service of April 7, 1933

§ 3 (1) Civil servants who are not of Aryan descent are to be placed in retirement. . . .

(2) No. 1 does not apply to officials who had already been in the service since the 1st of August, 1914, or who had fought in the World War at the front for the German Reich or for its allies, or whose fathers or sons had been casualties in the World War. . . .

§ 4 Civil servants who, based on their previous political activities cannot guarantee that they will always unreservedly support the national state can be dismissed from service. Their previous salary will be maintained for the duration of three months following their dismissal. From this time on they shall receive three-fourths of the pension. . . .

§ 6 To simplify administration, civil servants may be placed in retirement, even when they are not yet unfit for service. If civil servants are retired for this reason, their posts may not be refilled.

Schur's dismissal 1933, his unwillingness to emigrate and the alleged support by Erhard Schmidt in his temporary reinstatement, according to Alfred Brauer (1973)

“The years from 1915 to 1933 were extremely successful for him professionally. Thus it was a terrible blow when at the end of April 1933 a rumour circulated that SCHUR would be suspended from office. On the 1st of May this rumour became a fact. During the afternoon of that day ROHRBACH and I called on SCHUR in order to express the hope that his retirement would only be temporary. Outwardly SCHUR was completely calm and composed. But inwardly his capacity for work was seriously impaired by this event.

However, ERHARD SCHMIDT succeeded in his efforts to have the retirement **revoked** from the winter semester 1933/4 because even according to the laws of that time it was unlawful on the grounds that SCHUR had become a Prussian civil servant already before the end of the First World War. Hardly had the retirement become known when SCHUR received an offer from the **University of Wisconsin** at Madison. **But he declined it because he no longer felt strong enough to give lectures in a different language.”**

Vereidigungsnachweis.

Der Unterzeichnete

(Name und Dienststellung) *Dr. Issai Schur, ordentlicher Professor*
in der Philosophischen Fakultät der Friedrich - Wilhelms -
Universität zu Berlin

hat heute den Diensteid der öffentlichen Beamten wie folgt geleistet:

„Ich schwöre: Ich werde dem Führer des Deutschen Reiches und Volkes, Adolf Hitler, treu und gehorsam sein, die Gesetze beachten und meine Amtspflichten gewissenhaft erfüllen, so wahr mir Gott helfe“.

(Ort) *Berlin*, den *22.* *Oktober* *August* 1934.

(Unterschrift):

Dr. Issai Schur



Schur

Issai Schur oath to Adolf Hitler shows that there is no doubt about Schur temporary reinstatement.

However, W. Ledermann and P. Neumann put doubt on Brauer's remark that he did not feel fit for teaching in English and therefore did not emigrate.

They quote a letter from the Nazi education ministry to Schur, dated 11. September 1933 and saying:

«Dear Professor,

I thank you for your communication of 2nd September, with the information that you are invited to America as guest lecturer. I should like to ask you, however, to take account in your decision of the fact that according to the decision that has already been made by the Minister, measures of any kind based on the *Beamtengesetz* [Law on Civil Servants] will not be applied to you. May I ask you for a short note to say whether I should nevertheless process your request for leave.»

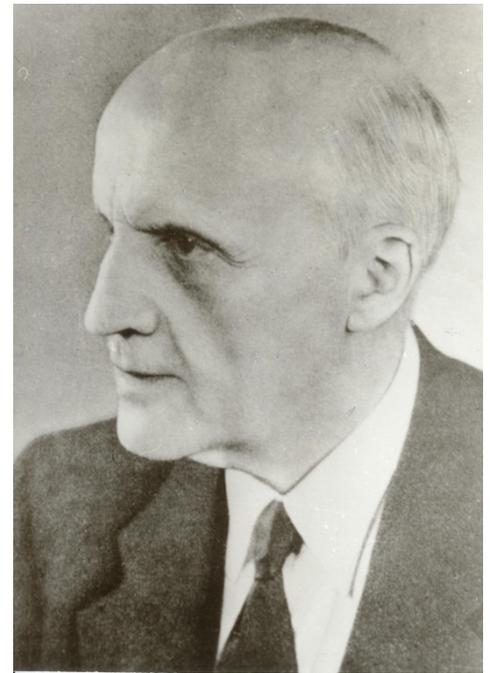
I believe that Schur, who then retracted his application, was lulled by the ministry into a false security and that he jumped on the occasion not to be forced to emigration.

This seems easily reconcilable with the assumption that he did not feel comfortable teaching in English which was «a real foreign language» to German intellectuals at the time.

Erhard Schmidt's contradictory behavior towards Schur

From an indirect source, namely Schur's student Max Schiffer (1911–1997), who was in Palestine from 1933 where he met Schur in 1939, we have another report about Schur's time in Berlin after 1935. Following Schur's information Schiffer says that the physicist Max von Laue and the mathematician Erhard Schmidt visited Schur after his dismissal. In the same report Schiffer quotes Schur's memories of one of these visits, a quotation which has to be evaluated with caution:

““When he complained bitterly to Schmidt about the Nazi actions and Hitler, Schmidt defended the latter. He said, suppose we had to fight a war to rearm Germany, unite with Austria, liberate the Saar and the German part of Czechoslovakia. Such a war would have cost us half a million young men. [...] Now Hitler has sacrificed half a million Jews and has achieved great things for Germany. I hope some day you will be recompensed but I am still grateful to Hitler»



Erhard Schmidt (1876-1959)

It is clear that Schmidt – unlike Laue – only rarely had the courage of resisting the regime openly. After the war, German mathematicians were desperate to construct him as the «good German mathematician».

Schur's increasing isolation after his dismissal 1935

In the same source, a talk given by Menahem Max Schiffer in 1986 (published by H. Begehr in 1998), we read:

«Schur told me [in Palestine] that the only person at the Mathematical Institute in Berlin who was kind to him was Grunsky, then a young lecturer.

Long after the war. I talked to Grunsky about that remark and he literally started to cry: 'You know what I did? I sent him a postcard to congratulate him on his sixtieth birthday [1935]. I admired him so much and was very respectful in this card. How lonely must he have been to remember such a small thing.'»

Helmut Grunsky (1904-1986) worked in complex function theory and edited 1968 for Springer Schur's «Vorlesungen über Invariantentheorie» which, according to Schiffer, was a «great success».

In 1932 Schur had been second advisor for Grunsky's Ph.D. thesis on conformal mappings. The main supervisor had been Ludwig Bieberbach.

Excursus: The failure of Richard Brauer's book on algebra in 1935 or the paradoxical victory of "talmudic mathematics" due to Nazi rule

3 main actors: Courant in New York, Richard Brauer in Princeton and Toronto (where he had moved in the fall 1935, after mediation by Emmy Noether, see mactutor), van der Waerden in Leipzig.

In the intellectual background act Emmy Noether, who had died on April 14 that same year at Bryn Mawr and Issai Schur, dismissed in Berlin.



Richard Brauer (1901–1977). Brauer, who was expelled from Königsberg in Eastern Prussia, was, through his work on the theory of algebras and groups, the most important student of Issai Schur's in Berlin.

The publication of a textbook on algebra, for which he had a contract with the Springer publishing house in Berlin, did not materialize due to the circumstances of emigration and the discrimination of Jewish authors in Germany. After a stopover of several years in Toronto, Brauer received an appointment as a professor at Harvard University since 1952.

In a letter to van der Waerden on August 20, 1935, Richard Courant (1888-1972), formerly Göttingen, now refugee in New York, but still editor of the Springer Yellow Series, explained, how the plans for Brauer's book came into being:

An ancient plan by Schur for the edition of Frobenius' lectures on algebra had been converted for long into a plan for the edition of Schur's lectures. Schur then had nominated Richard Brauer as a collaborator and gradually shifted the responsibility onto the latter. After very careful deliberations also with Emmy Noether the contract was completed thereby clearly indicating it should be a "concrete algebra" and in a way a complement of your book. . . Over here Brauer has worked much on the book—in very intimate contact with Emmy Noether to whom he was closer than any other human being.

Courant to Richard Brauer on October 28, 1935:

One of the points of attack against Springer is his close contact to Jewish emigrant-authors. Now there is danger of a concentric attack within Germany with respect to your Algebra, with many people putting into question the objective need for the book on the German market given the existence of many algebra books (Perron, Hasse, Haupt, van der Waerden,...). Apparently van der Waerden and Schmidt have asked Springer to postpone the publication of the book to more quiet times. I have fought a long battle in this matter in which I have come to the conclusion that compromises are not possible in this case and that - given the changed situation - you have to be free to publish the book, in the form as you want it, with an English or American firm. . A repayment of the advance is out of the question

Brauer to van der Waerden on November 24, 1935:

Courant wanted me to write an elementary book on algebra rather. ... It was supposed to address a different readership than your book, younger students, which had not yet gained understanding for axiomatic, abstract thinking. Addressed to people whose interest was more in analytical direction and who shared the prejudices against the modern 'abstract' (or 'talmudic') algebra which have never died out. To use Courant's words the book was supposed to build a bridge to the 'abstract' algebra, such that the regions on both banks be given due attention.

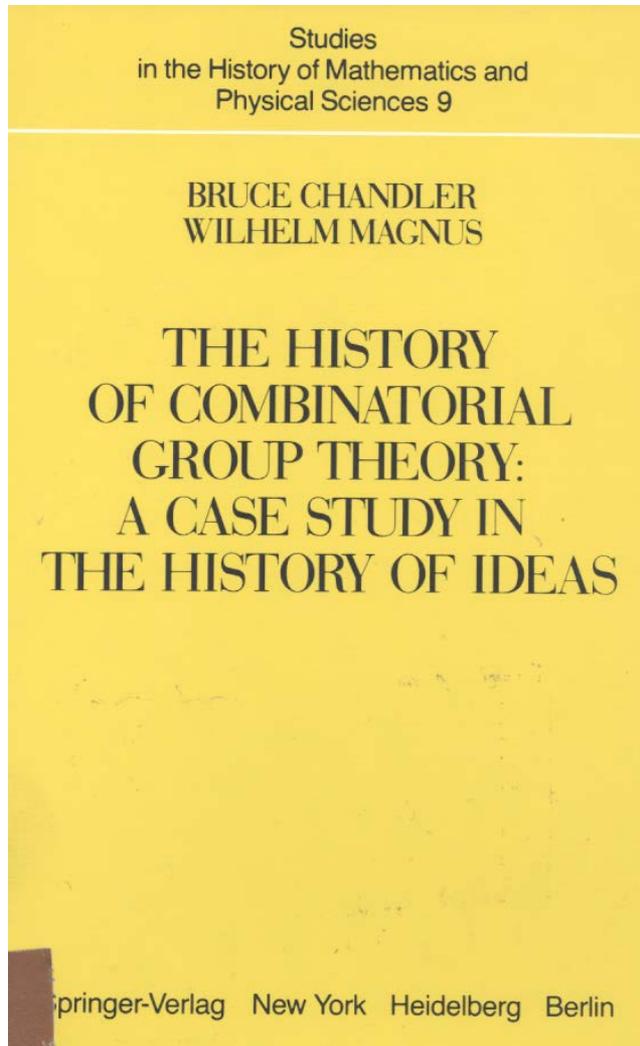
Hermann Weyl in Noether-obituary - Scripta Mathematica 3 (1935), 201-220:

“From different sides, Richard Brauer and she dealt with the profounder structural problems of algebras, she in a more abstract spirit, Brauer, educated in the school of the great algebraist I. Schur, more concretely operating with matrices and representations of groups; this, too, led to an extremely fertile cooperation. ...

She (Noether) possessed a strong drive toward axiomatic purity. All should be accomplished within the frame and with the aid of the intrinsic properties of the structure under investigation; nothing should be brought from without, and only invariant processes should be applied. Thus it seemed to her that the use of matrices which commute with all the elements of a given matrix algebra, so often to be found in the work of Schur, was inappropriate; accordingly she used the automorphisms instead. This can be carried too far, however, as when she disdained to employ a primitive element in the development of the Galois theory. ...

In addition to Artin and Hasse, who in some respects are akin to her, there are algebraists of a still more different stamp, such as I. Schur in Germany, Dickson and Wedderburn in America, whose achievements are certainly not behind hers in depth and significance. Perhaps her followers, in pardonable enthusiasm, have not always fully recognized this fact.”

The flowering of the Schur school abroad: the example of combinatorial group theory



This book from 1982 shows that it would be one-sided to assume that Noether's abstract structural algebra took over globally, although, of course it had indisputable impact on Bourbaki etc. In fact, the majority of the members of the Schur school emigrated while many of the Noether school (Deuring, Grell, Witt, van der Waerden) remained in Nazi Germany.

Alfred Brauer (1973) on the difficulties to prepare Schur's obituary to Landau (1938)

“During the short time when ROHRBACH was still an assistant in the Mathematics Department of the University of Berlin, it was possible to consult indirectly some books of the departmental library. But when ROHRBACH lost this position and went to Göttingen as an assistant, we were more and more cut off from the mathematical world. Here is an example as illustration.

When LANDAU died in February 1938, SCHUR was to deliver a memorial oration at his graveside. For this purpose he required some mathematical facts which he could not remember. He asked me to try to ascertain these from the literature. Of course, I was debarred from visiting the library of the Mathematics Department for whose development I had worked so many years. So I made an application to the Prussian State Library. On payment of a fee I obtained permission to use the reading room of the library for one week. Thus I was able to answer at least some of SCHUR's questions.”

JÜDISCHE RUNDSCHAU

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BERLIN

כ"ה אדר א' תרצ"ג

DIENSTAG, 1. MÄRZ 1938

Erhalten jeden Dienstag und Freitag. Giltig ist die Anzeigenpreliste
 Nr. 4 vom 1. April 1936. Die Anzeigenpreise sind 20 Rpl. für Familien-
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Der Zionismus erstrebt für das jüdische Volk die Schaffung einer öffentlich-rechtlich gesicherten Heimstätte in Palästina. (Baseler Programm)

Nr. 17, 1. III. 1938

Prof. Edmund Landau

In der Nacht zum 19. Februar ist Edmund Landau im Alter von 61 Jahren einem Herzschlag erlegen. In ihm verliert die Wissenschaft einen der bedeutendsten Mathematiker unserer Zeit, eine Persönlichkeit von stärkster Kraft und Eigenart. Die Hauptmerkmale seines großartigen Schaffens waren eine gewaltige Arbeitskraft, eine nie ruhende Energie in schöpferischem Vorwärtsdringen und



Prof. Landau Privatfoto

Aufbauen, verbunden mit schärfstem Sinn für Präzision und mit kritischem Urteil. Sein Lebenswerk umfaßt eine stattliche Reihe von größeren Werken, wozu noch gegen 300 Einzelabhandlungen hinzukommen. Die analytische Zahlentheorie sieht in ihm einen ihrer führenden Meister; es ist zu großem Teil sein Verdienst, daß sie in den letzten vier Jahrzehnten den Rang einer weitverzweigten mathematischen Disziplin erlangt hat. Ebenso verdankt ihm die Funktionentheorie eine Fülle wichtiger Neuschöpfungen und neuartiger Forschungsarbeiten. Er war ein Lehrer großen Stils, ein Künstler im konzipieren Darstellen eigener und fremder Ergebnisse. Am glanzvollsten hat er dies in seinen beiden

Hauptwerken bewiesen, der zweibändigen „Lehre von der Verteilung der Primzahlen“ (1909) und den dreibändigen „Vorlesungen über Zahlentheorie“ (1927).

Edmund Landau wurde am 14. Februar 1877 als Sohn des bedeutenden Mediziners Leopold Landau in Berlin geboren. Er studierte in München und Berlin, 1901—1909 wirkte er bereits mit großem Erfolg als Privatdozent an der Berliner Universität. Im Jahre 1909 wurde er nach dem Tode Hermann Minkowskis als ordentlicher Professor nach Göttingen berufen, wo er bis 1933 die bedeutungsvollste Zeit seines Lebens verbracht hat. Seitdem lebte er in intensivem Weiter-schaffen in Berlin. Jahrzehntlang empfing er seinem wachsen-den Ruhm entsprechend hohe wissenschaftliche Ehrungen, er war Mitglied zahlreicher Akademien des In- und Aus-lands und Ehrendoktor der altberühmten Universität in Oslo.

Einem alten Geschlecht entstammend, fühlte sich Landau aufs stärkste im Judentum verwurzelt. Es erfüllte ihn mit größtem Stolz, Rabbi Jecheskel Landau in Prag zu seinen Vor-fahren zu zählen; ihm zu Ehren pflegte er sich mit Vorliebe „Edmund Ezechiel Landau“ nennen zu lassen. Mit leiden-schaftlicher Liebe hing er am Palästina-werk, insbeson-dere am Schicksal der Universität in Jerusalem. Er war Mitglied des Kuratoriums der Universität, und es ist seiner Initiative zu verdanken, daß die mathematischen Lehrstühle an der Universität so trefflich besetzt sind. Mit bewundern-werter Energie wußte er noch in reiferem Alter der Schwierig-keiten der hebräischen Sprache Herr zu werden. Nachdem er im Jahre 1925 bei der Abfassung einer hebräisch zu ver-öffentlichenden Abhandlung zum Teil noch fremder Hilfe be-durfte hatte, konnte er schon 1927 monatelang in Jerusalem eine längere Vorlesung in fließendem Hebräisch halten.

J. Sch.

Issai Schur's obituary to his friend Edmund Landau (1877-1937), prepared with the help of his Jewish assistant Alfred Brauer, who later (1973) wrote the most detailed obituary of Schur.



Der Berlin function theorist **Ludwig Bieberbach** (1886-1982) supported the Nazi student boycott in Göttingen against Schur's friend Edmund Landau (1877-1938).

In 1928 Bieberbach and Schur had published, a well-known joint article in the Proceedings of the Academy.

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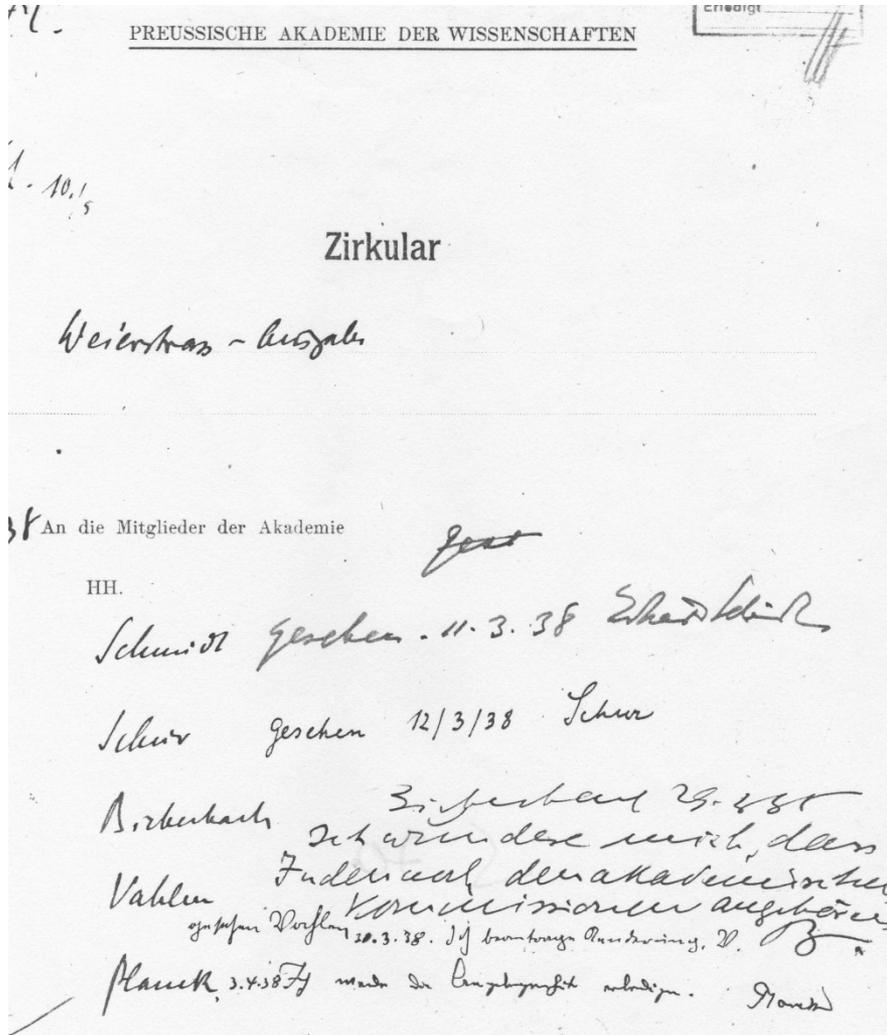
Sitzung der physikalisch-mathematischen Klasse vom 13. Dezember 1928

Über die MINKOWSKISCHE Reduktionstheorie der positiven quadratischen Formen.

VON L. BIEBERBACH UND I. SCHUR.

The final blow: Schur's dismissal from the Berlin Academy's commissions due to Bieberbach's denunciation.

In March and early April 1938 mathematicians and physicists of the Academy who belonged to the academic commission for the publication of Karl Weierstrass' works signed a circular.



It begins with the signatures of Erhard Schmidt and Issai Schur, who both wrote: “read” [gesehen]. The following signatures were [see facsimile below]:

29 March, Bieberbach: “I find it surprising that Jews are still members of academic commissions.”

30 March, Th. Vahlen: “I propose modification.”

3 April, M. Planck, who was Secretary of the Academy: “I will take care of it.”

In the relevant file of the Academy,

Schur's resignation from the academic commissions follows immediately. Half a year later Schur had to resign from the Academy altogether.

Alfred Brauer (1973) continues on the time immediately before emigration to Palestine (1938/39):

“Throughout those years I often visited SCHUR. The constant introduction of new regulations intended to make the life of German Jews more difficult made SCHUR deeply depressed. He obeyed all these laws most meticulously. Nevertheless it happened a few times that after I had rung the bell at his door, he opened it and called out with relief: "Oh, it is you and not the Secret Police [Gestapo] ...

The main difficulty was as follows. SCHUR and his wife intended to emigrate to Israel and had the necessary money. Unfortunately, however, Mrs SCHUR had inherited a fairly large mortgage on a house in Lithuania. In accordance with Lithuanian currency regulations this mortgage could not be repaid. SCHUR was forbidden to renounce the mortgage or to transfer it to the German Government. It had to be added to his other assets and an emigration tax amounting to twenty-five percent of the total sum would have to be paid. SCHUR did not have enough money for that. After several months a benefactor was found who put the necessary amount of money at his disposal. Of course, it was very painful for SCHUR that he was compelled to accept this gift.

Schur's review for Alfred Brauer immediately before both left Berlin

Dr Alfred Brauer has been extraordinarily close to me for almost 20 years. I regard him as one of the most valuable persons to have entered my life, and I esteem him equally as a loyal friend and collaborator and as an excellent teacher and scholar.

He was already a respected author when, in 1928, he obtained his doctorate at the University of Berlin by virtue of a first-rate work on Diophantine equations. Soon thereafter he **accepted the position of managing assistant at the Mathematical Seminar** as well as teaching duties as a lecturer. Until his resignation in the autumn of 1935 he proved in these positions to be **an eminent manager of the library** and a teacher with a remarkable talent for organization and education. For years he supported me in a most efficient manner at various seminar exercises and he had a major part in their success. In numerous papers, especially in the fields of number theory and combinatorics he has been prominent as a research worker of rare acumen and penetrating power. To his most distinguished achievements belong his beautiful investigations of sequences of power residues (Proceedings of the Berlin Academy 1928), which are characterized by an ingenious conjunction of combinatorial methods with elementary number theory. In an equally attractive manner his masterly handling of these methods becomes evident in **his important contributions to modern additive number theory**, which were completed quite recently, and which will shortly be published in the Annals of Mathematics and in the Mathematische Zeitschrift respectively.

I emphasize moreover Dr Brauer's extraordinary precision and conscientiousness in his work, and also his rare kindness and wisdom in his dealings with young students.

Berlin, 28th March 1938

Prof. Dr. I. Schur

May 2, 1939

MATHEMATICIANS AND PHYSICISTS
 whose records have been sent to
 American Friends Service Committee

- in the column "Acad. Position" means: "held no academic position proper". Privatdozentur is Assistantship is not, counted as such. For exact positions see individual records.

The significance of scientific output is the basis for rating under column "Scholarship". In judging Scholarship age has to be taken into account. "B" indicates successful research work of considerable originality.

	Schol- arship	Person- ality	Teaching ability Adapta- bility	Posi- tion	Birth Date	Remarks
Karl Loewner	A	B	A		1893	<i>Louisville!</i>
S. Lubelski	B ⁻	C	C	?	1902	
Anton E. Mayer	C	B	A		1903	As assistant had considerable teaching experience
Hermann Muentz	A	C	B		c.1895 ?	
Fritz Noether	B	A	B		1884	
Max Pinl	C ⁺	-	-		1897	Actuarial experience
Felix Pollaczek	B(?)	B	B	-	1892	Combination of pure mathematics and physics (telegraph and telephone)
Fritz Reiche	B	B	A		1883	
Max Reiss	C	B	-	-	1903	
Robert E. Remak	A ⁻	B	C		1888	
Artur Rosenthal	B	B	A		1887	<i>K.C.?</i>
Peter Scherk	C	B	B	-	1910	
Issai Schur	A	A	A		1875	As scholar, personality and teacher, superior to all others
Stefan Schwarz	C	B (? or A)	-	-	1914	Fellowship would be suitable

THE INSTITUTE FOR ADVANCED STUDY
SCHOOL OF MATHEMATICS
PRINCETON, NEW JERSEY

April 30, 1940

Dear Professor Shapley:

You remember my concern about Issai Schur, formerly at Berlin University, now living at Tel-Aviv, Palestine, whom I, and many others, consider the greatest living algebraist. In a conversation in Philadelphia late last year you mentioned the possibility of raising from private sources enough money to subsidize a research position for him for a couple of years. In the meantime I have made inquiries about Schur's financial situation and state of health.

From the shock which he received in the November 1938 pogrom he has more or less recovered. He has given occasional talks on mathematical subjects at the University of Jerusalem, and is busy again with his research work. But he is still in a frame of mind where he wishes the world to forget him, and Mrs. Schur thinks it inadvisable to attempt a second transplantation. Schur's former assistant and intimate friend, Alfred Brauer, who is now my assistant, tells me that Mrs. Schur herself had wanted very much to go to Palestine where their son lives, and he is afraid that this consideration has influenced Mrs. Schur's advice perhaps more than she realizes. It is impossible to get Schur's own reaction. But taking everything into account, I believe that it would be best to finance a research position for Schur at the University of Jerusalem rather than in this country.

Hermann
Weyl writing
to Harvard
astronomer
Harlow
Shapley who
led a refugee
committee:

Schur's problems to find a job in Palestine:

“The Department of Mathematics of the Hebrew University in Jerusalem, which was organized by the famous specialist in the axiomatic set theory Abraham Fraenkel, asked him to present a lecture, but had not invited him to join the department, maybe because of the lack of interest in the theory of group representations, Schur's frail health and his insufficient knowledge of Hebrew.” (Michael Sonis in “Studies on Schur”, 2003)

Revocation of Schur's German citizenship by Nazi authorities in 1942, even after Schur's death, with the aim to spare his pension

We find the following letter in his personal file at Berlin University:

Universitätskurator an Universitätskasse, 19.1.42 :

„Dem emer. Ordentl. Professor Dr. Issai Israel Schur, der seinen gewöhnlichen Aufenthalt im Auslande (Palästina) hat, ist gemäß § 2 der Elften Verordnung zum Reichsbürgergesetz vom 25.11.41 – RGBI I, S. 722 – die deutsche Staatsbürgerschaft entzogen worden.

An den Genannten sind daher gemäß § 10 a.a.O. keinerlei Emeritenbezüge mehr zu zahlen.“

PROBLEMS OF MATHEMATICS

PRINCETON UNIVERSITY
BICENTENNIAL CONFERENCES



1746 · PRINCETON UNIVERSITY · 1946

PRINCETON, NEW JERSEY

Attending only a few foreigners, among them the foreigner from Canada, Richard Brauer, whose group theoretic progress is celebrated:

Proceedings of session on “Algebra”:

“The discussion in this, the first session, could not find time to cover all of algebra. Two main lines can be seen, however, one the generalization of known results with an eye toward increasing their scope and learning more of their inner meaning—this going on at widely different levels of abstractness and the other the **continuation along classical lines, represented by Brauer's imposing advance.**”

“Brauer’s result represents a decisive step in the generalization of class-field theory to the non-Abelian case, which is commonly regarded as one of the most difficult and important problems in modern algebra.”

Continued from algebra-session in Princeton 1946, referring to another student of Schur's:

“A general Galois theory was characterized by Jacobson as beginning with ‘some sort of system in the field’ and then setting up ‘some sort of correspondence between the intermediate fields and the subsystems of the system.’ He presented two such theories, one based on the notion of self-representation, which was introduced by Kaloujnine, and a second, applying to the noncommutative case, which combined self-representations, the allied notion of a relation space and the methods of the structure theory of rings.” (312)

Final session of the mathematics conference with presentation by Weyl:

"In his oration in honor of Dirichlet, Minkowski spoke of the true Dirichlet principle, to face problems with a minimum of blind calculation, a maximum of seeing thought. I find the present state of mathematics, that has arisen by going full steam ahead under this slogan, so alarming that I propose another principle: *Whenever you can settle a question by explicit construction, be not satisfied with pure/y existential arguments.*"



Landau's tombstone on the Jewish cemetery in Berlin-Weissensee in state 1988.
According to Herr Wefelscheid now restored.



Schur's and Regina Schur's
tombstone in Tel Aviv