

Mathematics at Göttingen under the Nazis

Saunders Mac Lane

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The Mathematical Institute in Göttingen in 1931 had an outstanding tradition: Gauss, Riemann, Dirichlet, Felix Klein, Minkowski and Hilbert. It was located in a new and ample building (thanks to the Rockefeller Foundation, which had also provided such a building for mathematics at Paris). The library was ample, and included a famous thesis filling a trunk and giving an explicit construction "by ruler and compass". The faculty was small (by present standards) but superb, with a large representation of young people.

Before my time, many American mathematicians (most recently H. B. Curry) had studied in Göttingen. Here I will summarize my own experiences there, quoting at some length from a few letters which I wrote at the time (1933), since they record my reactions on the spot.

In 1931, after graduating from Yale and spending a vaguely disappointing year of graduate study at Chicago, I was searching for a really first-class mathematics department which would also include mathematical logic. I found both in Göttingen.

Hilbert had retired from his professorship, but still lectured once a week on "Introduction to Phi-

losophy on the Basis of Modern Science". His successor, Hermann Weyl, lectured widely on differential geometry, algebraic topology and on the philosophy of mathematics (on which I wrote up lecture notes). From his seminar on group representations, I learned much (e.g., on the use of linear transformations), but I failed to listen to his urging that algebraists should study the structure of Lie algebras. I also was not convinced by his assertion that set theory involved too much "sand". Edmund Landau (professor since 1909) lectured to large audiences with his accustomed polished clarity—and with assistants to wash off used (rolling) blackboards. Richard Courant, administrative head of the Institute, lectured and managed the many assistants working on the manuscript of the Courant-Hilbert book. Gustav Herglotz delivered eloquently his insightful lectures on a wide variety of topics: Lie groups, mechanics, geometrical optics, functions with a positive real part. Felix Bernstein taught statistics, but left in December 1932 before the deluge struck. These were then the *ordentliche* professors in Göttingen.

The *ausserordentliche* Professoren (with much less prestige) included Paul Bernays, Paul Hertz and Emmy Noether. Hertz lectured on causality and physics (the famous Physical Institutes, with Max Born, Richard Pohl and James Franck were right next door). Paul Bernays worked with Hilbert in logic and on the preparation of the prospective Hilbert-Bernays book *Grundlagen der Mathematik*. He also taught (with less enthusiasm) the famous Felix Klein course Ele-

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mentary Mathematics from the Higher Standpoint (intended chiefly for future gymnasium teachers). Emmy Noether (whom Weyl regarded as his equal) taught enthusiastic but obscure courses on her current research interests (e.g., on group representations and on algebras). Her inspired students included Ernst Witt and Oswald Teichmüller.

There were many young *Privatdozenten* and *Assistenten*, including Hans Lewy, from whom I learned about P.D.E., Otto Neugebauer (history of mathematics) and Arnold Schmidt (logic), as well as Herbert Busemann, Werner Fenchel, Franz Rellich and Wilhelm Magnus. Often we went to the fine restaurant at the nearby railroad station for good food and discussion. There were many eager students, including Gerhard Gentzen (logic), Fritz John, Peter Scherk, Olga Taussky, and Ernst Witt.

The social life included a one-time dancing party at Professor Weyl's apartment. If on a Sunday you called at the palatial home of Edmund Landau to leave your card, that action would ensure an invitation to a subsequent Landau party, complete with competitive games. At one point, Landau had invited G. H. Hardy for a visit, so Landau went to the train to meet him. Hardy, in a trench coat and dark glasses, stepped down from his car. Landau pounced on him and asked for the latest results on the "minor arcs" used in analytic number theory; Hardy responded, to Landau's dismay, that he had lost all interest in the subject. It turned out that the dark glasses hid not Hardy, but a Landau student anxious to play a trick.

There were many other visitors. Paul Alexandroff came to present the latest formulations of algebraic topology (as in his slim volume *Einfachste Grundbegriffe*). Emil Artin came from Hamburg to expound the obscure beauties of the class field theory. Oswald Veblen lectured (at one meeting of the weekly colloquium) on projective relativity theory. As always, the colloquium was preceded by tea and a display of the latest issues of journals. Richard von Mises was then a professor at Berlin (the long-time rival of Göttingen mathematics). He gave an evening lecture on his (somewhat ambiguous) foundation of probability theory on his notion of a *Kollektiv*. The whole Göttingen establishment listened, and then (Hilbert, Bernays, Bernstein, and others) denounced his approach. In brief, new ideas were forcefully presented and discussed. There was plenty of personal contact; for example, for a period I lived in Courant's house in order to teach him the use of English in preparation for his planned visit to the U.S.A.

Thus the Mathematical Institute at Göttingen in 1931–1932 was a dynamic and successful model of a top mathematical center.

In 1931, Germany faced massive economic and political problems. The Great Depression had caused much unemployment in Germany, and many Germans still recalled clearly the painful postwar inflation. The German chancellor (Bruning) did not have a secure majority in the Reichstag, so he ruled by emergency decrees. The people I knew were concerned by these issues and often had liberal or left-leaning sympathies, but I recall no one who correctly foresaw the future. I arrived in Germany first in Berlin to learn German and to absorb the culture (e.g., Bertold Brecht and the *Drei Groschen Opera*). There communists and social democrats competed with Nazi storm troopers (the SA). I carefully studied a pamphlet *The Twenty-seven Political Parties of Germany*; the Weimar republic had managed to get politics badly fragmented. Once I settled in Göttingen, I could note every Sunday the young students with bandaged faces—they came from practice duels of the "color" (corps) fraternities; perhaps they anticipated general admiration for professors of law who sported impressive dueling scars. Once in the winter, I defended a street urchin who had unwisely lobbed a snowball at a corps student. The student thereupon challenged me ("Your card, please"). I had no calling card on me, so declined the challenge. The student responded, "Mit solchen Leuten verkehren wir nicht"—"We do not associate with such people"—and indeed he did not, passing me often on the street with wordless disdain. Perhaps I was lucky. Martin Kneser told me that in 1912 George Polya was in Göttingen, was challenged by a student, declined—whereupon the rector advised him to leave the university. I managed to stay, to my great profit.

In 1932, German politics was turbulent with street battles in Berlin and elsewhere between Nazi storm troopers and communist groups. Then in January 1933, there was an election in which the Nazis made common cause with the German National Party (led by von Papen); these Nationalists probably thought that they could control Hitler; the combined vote was sufficient to make Hitler Reichschancellor. His speeches and his picture appeared everywhere.

On February 12, 1933, I took a study break to visit Weimar. On arrival, I went to the Opera House, but tickets for the next day were all sold out (it was the 50th anniversary of the death of Wagner). Fortunately, by standing outside the Opera House the next morning, I managed to get a ticket; the first half of the opera (Wagner, of course) was splendid. In the intermission, I walked out to the lobby. There, twenty-five feet away, stood Hitler and Göring (easy to recognize from their newspaper pictures). At that time (as I did some months later), I did not fully realize the prospects of evil. In later years, I vividly re-

called the sight of Hitler, but thought that it took place later, in May 1933. It thus later seemed to me to be the one occasion where (had I carried a weapon) I might have personally changed history.

On March 5, 1933, the government coalition held a second election, preceded by a vast propaganda effort. It produced a much larger vote for the government. The resulting situation is described in two letters which I wrote my mother—one dated March 10, 1933, and the other undated. (The author will provide copies of these letters on request.)

The first letter (10.III.33) is a tongue-in-cheek praise of propaganda. I had never before seen what official propaganda could do to alter opinion. By the time I left Germany in August, I felt so misled by continued propaganda that I did not know what was really going on in the world.

In the second undated letter ("address omitted"), I seem to be worried that my mail might be censored. I now think that this worry was groundless. But I was a bit concerned about my copy of *Das Kapital*; I recall that I carefully hid it in a drawer under some shirts. Actually, there was a book-burning in Göttingen on May 10, 1933. At about that time the copies of the *Literary Digest* which my mother sent me were no longer allowed to come.

After writing those letters, I went on a student-organized two-week skiing trip to Oberstdorf in the Tyrol. We returned (on a group ticket) by train, stopping for three hours in Nuremberg. This was the day for which Hitler had decreed a peaceful boycott of all Jewish stores. Leaving my skis and baggage on the train, I went to explore the town. There, at a big shoe store, I saw a seedy-looking man peering into the display window. The store was closed, but nevertheless the police spotted the man and at once hustled him off. Since I had supposed the boycott to be peaceful, I was curious and followed along. Soon I too was arrested. The earnest policeman assumed that I was one of the Anglo-Saxon reporters who were collecting lies about the Reich; he upbraided me. I tried to assure him that I was not a reporter, but only a student. He thereupon observed that if he were visiting the U.S.A., he would not intrude on the police. I tried my best to report that all my possessions were about to leave on a train—I was let go just in time to catch it. I returned to Göttingen to my lodgings at 28 Lötze Strasse (not far from the Mathematical Institute). There my landlady regularly provided me with evening tea and talk; I rapidly discovered that two weeks of propaganda had converted her from mild conservative views to ardent Nazi discipleship.

In Germany, professors, Privatdozenten and assistants are all government officials. On April 7, 1933,

a new law about such officials summarily dismissed all those who were Jewish, except for those appointed before 1914 and those who served as soldiers in the First World War. In addition, dismissal awaited "all those officials who are not at every time completely committed to the National Socialist State".

The effect on the Mathematical Institute was drastic. Courant, Noether, and Bernstein were immediately dismissed (on April 25). In Courant's case, his service in the First World War did not spare him; evidently his earlier political views and his wide mathematical influence (inherited from Felix Klein) made him disliked. With his departure, Neugebauer was made acting head of the Institute, but he lasted only one day, when he too was dismissed, apparently because of his political sympathies, but perhaps because he failed to mow his lawn! On April 27, Bernays, Hertz and Lewy were dismissed. Landau was advised not to lecture in the coming summer semester; he followed the advice. As a result of this, my letter of May 3 to my mother read (in part):

So many professors and instructors have been fired or have left that the mathematics department is pretty thoroughly emasculated. It is rather hard on mathematics, and we have but the cold comfort that it is the best thing for the Volk.

For that summer semester, things struggled along somehow. All the students who could do so hurried to finish up degree requirements. I had lost my thesis advisor (Paul Bernays); Hermann Weyl took his place, and subsequently gave me a tough oral examination. I managed, but in the definition of a Hausdorff space, I forgot the separation axiom but did not dare mention the fact that Weyl had once forgotten it in print. For another oral exam, I took a course on the philosophy of mathematics with Professor Moritz Geiger. Though Jewish, he had served in the First World War, so was still left in office. However, in every lecture I could notice his nervous anxiety about the future—a justified anxiety.

On July 14, I wrote my mother:

Just recently it has been proclaimed that the German revolution is now at an end; now things must proceed in evolution in a strictly legal fashion. That somehow gives the impression that up to the present everything has not proceeded in a strictly legal fashion, or at least that the SA (the Sturm Abteilung) has on occasion taken unto itself the rights and privileges

of the police. How far that has happened I cannot very well tell.

My fiancée, Dorothy Jones, had come to Göttingen from New York to help me finish my thesis. She learned much about the political situation. When she and I went to the Standesamt to get a wedding license, we were surprised to find there my fellow student Fritz John and his friend Charlotte. They were troubled to have us discover their presence. He was Jewish, she was not; they were anxious to get married quickly because he feared the prospect of a law which would prohibit such intermarriages. We agreed to secrecy; they invited us to their *feierliches Abend* after their wedding. Among the other guests were a blond German youth and his evidently Jewish girlfriend. Dorothy wrote my mother, "There is adventure amid romance in such a marriage."

On July 25, I wrote my mother:

Politics continue to be as absorbing as ever. Friday night Dorothy and I went to a Nazi speech on the new order of things in the German universities. It turned out to be a most sensible speech. The speaker (a prominent Nazi professor in Berlin) did not demand that Wissenschaft be completely bound down by politics. He said that Wissenschaft should be independent but not autonomous.... After the meeting, we went downtown and drank coffee with my friend Gebhardt (whom we had met at the meeting). There again we discussed politics, the influence of Catholicism (blind obedience) upon Hitlerism, and so on far into the night. I have recently become impressed with the great variety of opinions within the Nazi movement. All Nazis do not think alike, even though it may externally seem as if they did!

(Note, 1995: I no longer recall the discussion of Catholicism; I was then largely ignorant of German Catholicism and a great admirer of my grandfather's powerful sermon favoring tolerance.)

My oral exam still threatened—one on geometric function theory with that redoubtable professor Gustav Herglotz. I consulted my experienced friends: what to do? They reminded me that he loved to lecture. This I bore in mind during the exam:

Herglotz: What is the Erlanger Program?
SM: Everything depends on the group.

Herglotz: What is the group for complex analysis?

SM: The conformal group.

That sufficed to start Herglotz on a splendid lecture on geometric function theory in terms of the conformal group.

My thesis was done, and I was through.



The pleasant hills near Göttingen made excursions possible and attractive. One day, at her lecture, Professor Noether observed with distaste that the Mathematical Institute would be closed at her next lecture, in honor of some holiday. To save mathematical research from this sorry interruption, she proposed an excursion to the coffee house of Kerstlingeroden Feld, up in the hills. So on that day we all met at the doors of the Institute—Noether, Paul Bernays, Ernst Witt, etc. After a good hike we consumed coffee, talked algebra, and hiked back, to our general profit. There were other such excursions, as on the occasion of the visit by Oswald Veblen. The picture above (courtesy of Martin Kneser), with some uncertain identifications (was I really there?) may now testify to this.

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Standing: Paul Bernays, Hans Lewy(?), O. F. G. Schilling, Schwertfager(?). Woman facing right may be Olga Taussky, then Erna Barrow, Emmy Noether (almost hidden), Paul Alexandroff (?), (?).

Seated, front row: Ernst Witt, (?), Mac Lane(?), (?), (?).

But for the Institute, there were added losses. Hermann Weyl was not Jewish, but his wife was; this meant then that their two sons were so counted. So at the end of the summer semester 1933, Weyl left for a professorship at the Institute for Advanced Study in Princeton. All told, in 1933 eighteen mathematicians left or were driven out from the faculty at the Mathematical Institute in Göttingen. This included Landau; he was not officially dismissed, but when he again started to lecture in the winter semester of 1933,

the students organized a complete boycott of his lecture. He thereupon resigned and retired to Berlin.

Mathematics at the University of Berlin was also seriously disrupted; there twenty-three faculty members (including Richard Brauer, Max Dehn, Hans Freudental, B. H. Neumann, Hanna Neumann, and Richard von Mises) left. The specific (and often less extensive) effects at other German universities have been carefully tabulated by Maximilian Pinl in four articles. Detailed analysis of the situation at Göttingen has been presented by Schappacher as part of a book on Göttingen under the Nazis.

One observer has summarized the effect on mathematics in the following words:

Within a few weeks this action would scatter to the winds everything that had been created over so many decades. One of the greatest tragedies experienced by human culture since the time of the Renaissance was taking place—a tragedy which a few years before would have seemed an impossibility under twentieth century conditions.

There were attempts to rebuild mathematics at Göttingen. The eminent algebraist Helmut Hasse became professor and director of the Institute; for a period he had difficult dealings with several mathematicians with Nazi enthusiasm: Oswald Teichmüller, Werner Weber, Edward Tornier. Tornier was briefly co-director of the Institute; at one point he hoped to get Hasse removed from the directorship. Tornier favored the party; for example, he later wrote in the then new journal *Deutsche Mathematik*, 1936, vol. 1, page 2 (my translation):

Pure mathematics too has real objects—whoever wishes to deny this is a representative of Jewish-liberal thought, like philosophical sophisticates.... Every theory of pure mathematics has the right to exist if it is really in a position to answer concrete questions which concern real objects like whole numbers or geometric figures—or if at least it serves for the construction of things which happen there. Otherwise it is incomplete, or else a document of Jewish-liberal confusion, born from the brains of rootless artists who by juggling with object-less definitions mislead themselves and their thoughtless public.... In the future, we will have German mathematics.

Eventually, the four professorships at Göttingen were again occupied (Hasse, Herglotz, Kaluza, Siegel), but even with Karl Ludwig Siegel the former glory was not restored. At one point, Hasse hoped to increase his influence with the authorities. So, according to his son-in-law, Martin Kneser, he applied for membership in the Nazi Party, but it turned out that one of his grandmothers might have been a Jew; his application was put on hold till after the war. After the war, Hasse was dismissed as part of the denazification. Since then, the Göttingen Mathematical Institute has been gradually reconstituted as one of several such institutes at other German universities. But it has not succeeded in reclaiming its original brilliant dominance.

As Dorothy and I left in August of 1933, I carried with me, as a treasure, something of the vision of the earlier Göttingen as the unique model of a great mathematics department. I mourned the loss, but not only for the sake of science. I did not foresee the holocaust, but I was aware of the power of state propaganda and I was actively fearful of the prospects for a world war, although prevention seemed beyond my powers. Now in retrospect, the whole development is a decisive demonstration of the damage done to academic and mathematical life by any subordination to populism, political pressure and proposed political principles.

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