

Max Dehn, Kurt Gödel, and the Trans-Siberian Escape Route

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This article contains the text of an invited address prepared for a special session on the exodus of mathematicians from Nazi-occupied territories, held in Vienna in mid-September 2001 as part of a joint meeting of the Deutsche Mathematiker-Vereinigung and the Österreichische Mathematische Gesellschaft. Awareness of how difficult it was for those caught up in the rise of Nazism to escape from the terrors they experienced was reinforced by the terrorist attacks of September 11, which prevented the author's attendance at the conference. He is grateful to Professor Karl Sigmund of the University of Vienna for having read the paper in his absence and to Professor Michael Drmota for granting permission for its reprinting here. It originally appeared in the April 2002 issue of the Internationale Mathematische Nachrichten.

The careers of Max Dehn and Kurt Gödel followed very different trajectories. Yet Dehn and Gödel were linked by one historical circumstance: They were the only mathematicians of stature to flee the scourge of Nazism via the trans-Siberian railway. The stories of their escapes and the contrasts in their situations before and after their emigration exemplify both the perils and the limited range of opportunities that confronted intellectual refugees of the Holocaust.

In 1940 Max Dehn and Kurt Gödel each left Europe, never to return. Dehn was then a distinguished topologist nearing the end of his academic career, while Gödel was a young *Privatdozent* who had only recently burst into prominence for his startling discoveries in mathematical logic. Dehn was a Jew. Gödel was not. And their personalities were starkly opposed: Whereas Dehn was an outgoing, generous man, esteemed by students and colleagues alike for his humanity, his breadth of intellectual and cultural interests, and his love and knowledge of the outdoors, Gödel was a reclusive hypochondriac who had few close friends, worked in isolation, and suffered recurrent bouts of mental illness. Nevertheless, in a few respects their careers were similar: Both solved problems on

Hilbert's famous list [16]; both published important papers on decision problems; and both, by force of circumstance, emigrated to America via the trans-Siberian railway.

The disparity between the situations of Dehn and Gödel prior to their emigration exemplifies the diversity of backgrounds among the mathematicians who fled Hitler. The circumstances of their escapes highlight the dislocations, difficulties, and dangers such emigrés faced. And the contrast in their subsequent careers in America is illustrative of the range of institutions in the United States that provided havens for intellectual refugees.

Dehn's European Career

As yet there is no full-length biography of Max Dehn, nor a collective edition of all of his published works. But several shorter articles provide details of his life and mathematical accomplishments. For the present brief survey I have drawn primarily on [13], [15], and, especially, the chapter on Hilbert's third problem in [16].

Dehn was born November 13, 1878, in Hamburg, one of eight children of a physician, Maximilian Moses Dehn. According to Max's son Helmut, the family were secularized Jews who "lived by principles that some...would call 'good Christian'", and who did not think of themselves as Jewish until the Nazis came to power [16, p. 118]. After graduating from the *Gymnasium* in Hamburg, Max went first to Freiburg and later to Göttingen, where he

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received his doctorate in 1900 under Hilbert's supervision. In his dissertation he established that the Archimedean postulate is essential in order to prove in neutral geometry that the sum of the angles of a triangle does not exceed 180° (Legendre's theorem).

Later that same year, soon after Hilbert's address on "Problems of Mathematics" at the International Congress of Mathematicians in Paris (and before the appearance of its printed version, in which the list of problems was expanded from ten to twenty-three), Dehn established a related result that solved the third of the published problems (one of those left unstated during the lecture [8]): By exhibiting two tetrahedra with the same base and height that are neither equidecomposable into finite, congruent parts nor equicomplementable by such parts to produce two polyhedra that are equidecomposable, he demonstrated that the Archimedean postulate is also needed in order to prove that two tetrahedra of equal base and height have equal volumes.

For his solution of Hilbert's third problem Dehn was awarded his *Habilitation* at Münster, where he served as a *Privatdozent* from 1901 until 1911. In 1907 he was coauthor with Poul Heegaard of the influential survey article "Analysis situs" in the *Enzyklopädie der mathematischen Wissenschaften*. In 1910 he introduced the so-called "Dehn diagrams" for groups and published a fundamental paper on the topology of 3-dimensional space, which included the result that has since come to be known as "Dehn's lemma" (though with a proof later seen to be faulty) and the technique now called "Dehn surgery". That paper also introduced the word and conjugacy (decision) problems for groups, which Dehn explored further in two subsequent papers, the second of which employed an algorithm now named after him.

From 1911–1913 Dehn was *Extraordinarius* at Kiel, and from 1913–1921 *Ordinarius* at Breslau. On August 23, 1912, he married Toni Landau, who bore him three children during their years in Breslau. In 1914 Dehn published a proof that a trefoil knot is not continuously deformable into its mirror image—an important early result in knot theory. Then, from 1915–1918, his work was interrupted by army service.

In 1921 Dehn succeeded Ludwig Bieberbach as *Ordinarius* at Frankfurt, and the following year he founded a seminar there on the history of mathematics, whose history and significance, as well as Dehn's leadership role in it, is poignantly recounted in the memoir by Siegel cited above [13]. Dehn continued to direct the seminar until 1935, when, at age 56, the Nazis forced him to retire (later than most, due to his earlier war service).

After his removal from the university Dehn continued to live in Frankfurt for another three years.

For a time he received a pension and traveled to various European countries to lecture. He also continued to publish, including an important paper that appeared in 1938, in which he introduced the notion now referred to as "Dehn twists". By 1936, however, he had prudently sent his children out of reach of the Nazis, his son Helmut to the United States and his daughters Maria and Eva to a boarding school in Kent, England, where Dehn himself taught from January to April of 1938.

Later that spring Dehn returned to Frankfurt — a fateful act, as it turned out, for on November 11, 1938 (the morning after *Kristallnacht*) he was arrested by Nazi agents and taken to a local detention center. Providentially, however, he was released later that day, so many having been rounded up that there was no place to hold them all.

Subject to imminent re-arrest and deportation, Dehn and his wife immediately fled to Bad Homburg, where they were given shelter by his friend and colleague Willi Hartner; and there, in the company of Hartner and Siegel, Dehn celebrated his sixtieth birthday. Hartner recalled the occasion years later in a newspaper tribute to Dehn [9]: "Unforgettable for those who saw him at the time was his calmness, his philosophical composure. For the conversations centered not on the events of the day, but on the relationship of mathematics to art, on problems of archaeology, and finally on the concept of humanity of Confucius."

Once the brutal initial phase of the pogrom in Frankfurt ended, Dehn and his wife, with the assistance of Albert Magnus (son of Dehn's student and colleague, Wilhelm Magnus), managed to escape by train through Frankfurt to Hamburg, where they hid for a few weeks at the home of one of Dehn's older sisters who had been left unmolested because of her age. From there, with further help from Siegel and "a Danish colleague and former student of Dehn's" [15] — perhaps Jakob Nielsen — a way was found for the Dehns to escape to Denmark and from there to Norway. In January 1939 they reached Copenhagen, and not long afterward Dehn secured a temporary position at the *Technische Hochschule* in Trondheim as a replacement for Viggo Brun, who was then on leave.

Until March 1, 1940, when the Nazis invaded Norway, the Dehns were relatively safe. Financially, however, their situation was precarious. Before leaving Germany Dehn had been forced to sell his library and much of his furniture at great loss. He was, of course, paid by the *Hochschule* in Trondheim, and from the university in Frankfurt he somehow managed to obtain an official leave of absence, valid from April 1, 1939, until June 30, 1940, that enabled his pension payments to continue. They were credited, however, to an account in Hamburg from which disbursements could only be made to parties within the Reich, so that he was

unable to pay storage charges on what little furniture and other personal effects he had been able to ship to London. Consequently, they too were lost.

When the Nazis invaded Trondheim, the Dehns fled to the nearby countryside. But actions against the Jews there quickly subsided, so after a short time the Dehns moved back to the city, apparently with little effort at concealment. Indeed, correspondence preserved among Dehn's papers at the University of Texas includes a letter he wrote from Trondheim on June 5, 1940, requesting an extension of his leave of absence, and another dated August 29, 1940, informing the German authorities of his move to Hvalstad, near Oslo.

Under the circumstances it seems extraordinary that Dehn continued to behave as "a good German", dutifully making his whereabouts known and seeking official permission to remain longer in Norway. Perhaps he knew how long it would take for the Nazi bureaucracy to respond. In the meantime, with the help of Ernst Hellinger and other former colleagues who had escaped to the United States, he was making preparations for his own long journey to America.

Gödel's Life Prior to Emigration

Several sources provide details of Gödel's life and work. [1] is a full-length biography, while the introductory essay [6] in the first volume of Gödel's *Collected Works* is an excellent shorter survey.

Briefly, Gödel was born April 28, 1906, in Brno, Moravia, where he spent his youth. After graduating from the *Realgymnasium* there, he entered the University of Vienna in the autumn of 1924. Influenced especially by the lectures of Phillip Furtwängler and Hans Hahn, he soon switched from physics to mathematics and became active in the mathematical colloquium directed by Karl Menger. For a time he also attended meetings of Moritz Schlick's seminar, later to become famous as the Vienna Circle.

Unusually for the time, Gödel never enrolled in courses at any other university. In 1929 he was granted Austrian citizenship, and that same year he submitted his doctoral dissertation to Hahn. In it he established the semantic completeness of countable first-order theories. He was awarded the degree of Dr.Phil. on February 6, 1930.

The following September, at a conference in Königsberg, Gödel gave the first, somewhat veiled, announcement of his first incompleteness theorem. The second followed soon thereafter, and both were published in his epochal paper [7], which became his *Habilitationsschrift*. In 1933 he was granted his *Dozentur*, and that fall he accepted an invitation to spend the academic year 1933-1934 in Princeton, at the newly founded Institute for Advanced Study.

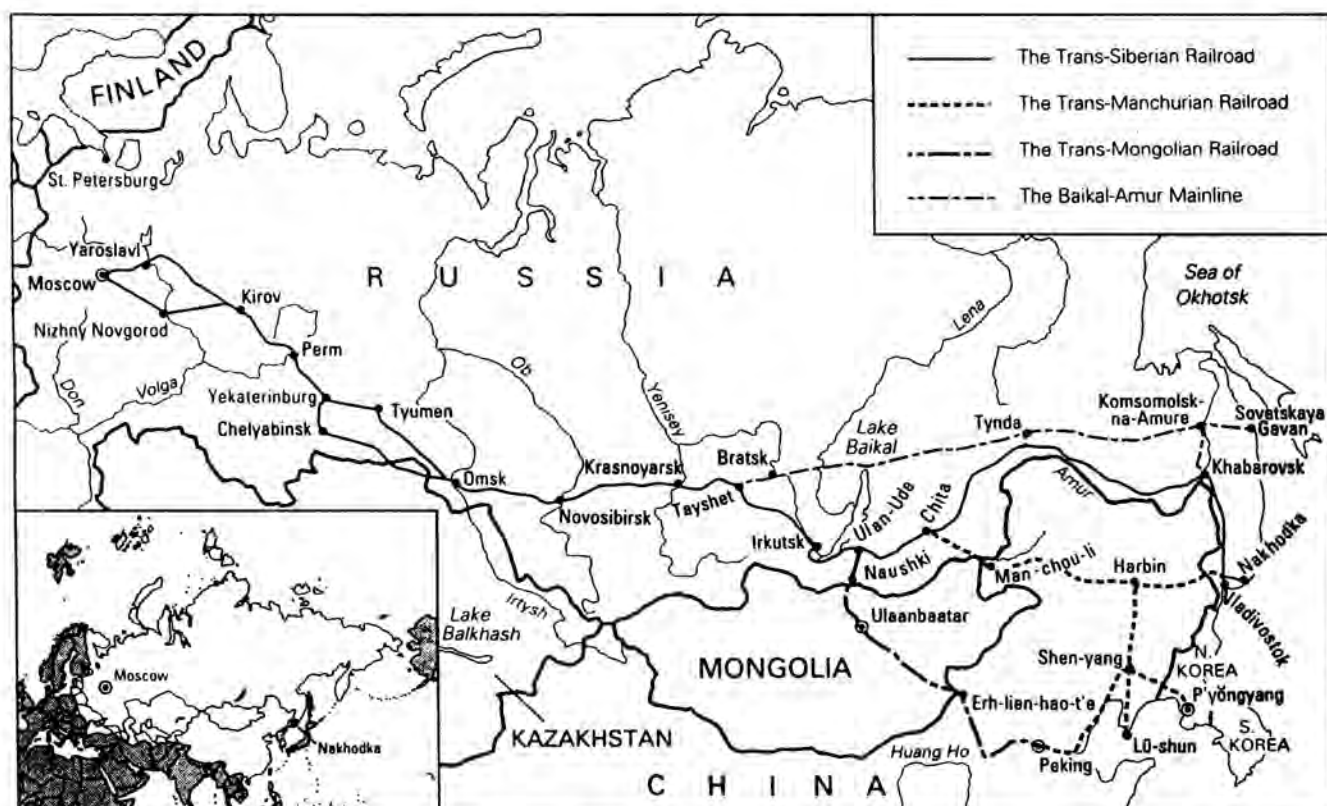
Shortly after his return to Austria in the spring of 1934 Gödel suffered a serious bout of depression and was admitted to a sanatorium in Purkersdorf bei Wien. By 1935 he had recovered enough to prove the relative consistency of the axiom of choice with the axioms of Zermelo-Fraenkel set theory, but a subsequent relapse left him incapacitated until the spring of 1937, when he finally succeeded in proving the relative consistency of the generalized continuum hypothesis as well.

Gödel taught for the last time in Vienna during the summer of 1937. The following spring, not long after the *Anschluß*, his authorization to teach was withdrawn and the unpaid rank of *Dozent* was abolished and replaced by that of *Dozent neuer Ordnung*—a salaried rank, but one that required vetting by the Nazi authorities. Gödel applied for the new title, but by the time it was granted he had already emigrated. ([14, p. 29], reproduces one of the letters evaluating Gödel's application.) In the meantime, while the financial situation in Austria deteriorated, Gödel was left unemployed.

Despite the uncertainty, in September of 1938 Gödel married, and soon thereafter he returned once more to America. He lectured that fall at the Institute for Advanced Study and went on in the spring of 1939 to the University of Notre Dame. He planned to return to the IAS again the following autumn, but on his return to Vienna he was called up for a military physical and declared fit for Nazi military service.

Even then, Gödel seemed strikingly oblivious to what was happening around him: In a letter to John von Neumann of September 17, 1939, he wrote, "Bei mir gibt es nicht viel Neues; ich hatte in letzter Zeit eine Menge mit Behörden zu tun. Ende September hoffe ich wieder in Princeton zu sein." ("There's not much news around here; recently I had a lot of dealings with the authorities. I hope to be in Princeton again around the end of September.") On September 30, in a letter to Karl Menger that Menger thought "set a record for non-involvement on the threshold of historic events", Gödel wrote, "Ich bin seit Ende Juni wieder hier in Wien u. hatte in den letzten Wochen eine Menge Laufereien, so dass es mir bisher leider nicht möglich war, etwas für das Kolloquium zusammenzuschreiben." ("Since the end of June I've again been here in Vienna, and in recent weeks I've had a lot of running around to do, so that up to now it was unfortunately impossible for me to compile anything for the colloquium.") And after his emigration, when asked by Oskar Morgenstern how things were in Vienna, he offhandedly replied, "Der Kaffee ist erbärmlich." ("The coffee is wretched.")

At the same time, however, Gödel had begun trying to find a way out: He applied both for a leave of absence from the university and an exit visa from the Reich, on the grounds that he had no



means of support in Austria but had been offered temporary employment by the IAS. Given his military status, the likelihood of his obtaining permission to return to the United States must have seemed remote; and there were difficulties on the American side as well. For although he had earlier possessed a U.S. immigration visa, he had forfeited it on his return to Austria in 1938, and thereafter U.S. policy stipulated that visas for those in teaching or research positions would be "granted only to applicants...who ha[d] had such positions...in the country they c[a]me from" in the "two years...immediately preceding their application."

In the end Gödel succeeded in obtaining the necessary documents, in large part due to the efforts of IAS director Frank Aydelotte, who interceded on Gödel's behalf with consular and immigration authorities in both Austria and the United States. (For details of the negotiations involved see [1, chapter VII].) Exit permits for Gödel and his wife were finally issued in December 1939, and the two left Europe in mid-January. By then, however, crossing the Atlantic had become quite risky. The alternative—explicitly stipulated by their exit permits—was to take the trans-Siberian railway, from whose terminus at Vladivostok they could cross the Sea of Japan and then voyage from there across the Pacific.

The Trans-Siberian Escape Route

Begun in 1891, the trans-Siberian railway was constructed in stages. From Moscow the tracks extended

some 9,200 km to Vladivostok, via one of two routes. The first, completed in 1901, crossed Manchuria. The second, following the course of the Amur river and lying entirely within Siberia, was built out of concern that the Japanese might take control of Manchuria (as they later did) and was completed in 1916.

Always a route of last resort, during the early years of the Third Reich the trans-Siberian railway was nonetheless taken by thousands of Holocaust refugees, most of whom emigrated in large groups either to Kobe, Japan, or Shanghai, China. (Among the former, the several thousand Polish Jews issued visas by the Japanese diplomat Chiune Sugihara are perhaps best known.) Later, after the last sea routes out of Europe were closed off in June 1940, and until June 1941, when Hitler violated the German-Soviet nonaggression pact by invading Russia, it was the only avenue of escape available to Europe's Jews.

The trip across the vast Russian taiga was long and grueling, especially during the winter, when there were long hours of darkness and temperatures sometimes fell to -50°C . Few emigrés left any account of their trans-Siberian experiences, and the Gödels were no exception. But from entries in Gödel's passport (see [14, p. 32]) and other documents in his *Nachlaß* we know that on January 18 he and his wife crossed from Latvia into Russia at Bigosovo and boarded a train for Moscow. Following the Manchurian route, they arrived in Yokohama on February 2, too late for the ship they intended to take, and remained there until February 20,



Kurt Gödel and wife Adele, in Vienna prior to emigration.

when they were at last able to board the *President Cleveland*. After an intermediate stop in Hawaii they debarked in San Francisco on March 4 and went on to Princeton by train. Altogether, their emigration took nearly two months. Yet, remarkably, despite his hypochondria and earlier mental health crises, Gödel apparently came through the long journey in good physical and mental condition.

The Gödels' departure was precipitate. Dehn and his wife, however, planned their escape with deliberation. How they procured the necessary documents to emigrate to the U.S. is unclear, but it is known that Dehn secured an academic post in America—a prerequisite to his admission as an immigrant—through the efforts of Clare Haas, a physician the Dehns had known in Frankfurt. Haas had found a position as a psychiatrist in Pocatello, Idaho, and she was able to arrange a temporary appointment for Dehn at Idaho Southern University (now Idaho State), where he served as associate professor of mathematics and philosophy from February 1941 through the spring of 1942 [16, p.129].

The Dehns finally left Norway in late October, and Dehn chronicled their journey in a talk he gave at Idaho Southern not long after his arrival there, the text of which is preserved as an eight-page typescript among his papers at the University of Texas [2]. According to that narrative, a small group of friends saw them off at the station in Oslo. At the frontier between Norway and Sweden their luggage was “ransacked” and they were treated “extremely unkind[ly] and rough[ly]” by the border guards—actions that led Dehn to wonder how “young people could exult in [such] unkindness without any real profit for themselves or their community.” They were delayed three weeks in Stockholm, allegedly because of an outbreak of plague in Manchukuo and Vladivostok, but actually, Dehn thought, for “obscure political” reasons. In the end they took the Amur River route and so did not pass through Manchukuo. Meanwhile they found Stockholm a pleasant place to stay, not least

because it was “splendidly illuminated”, in contrast to the blackout throughout the rest of western Europe.

At last the necessary tickets and travel documents were issued, the Dehns were vaccinated against smallpox, typhoid, paratyphoid, and plague, and they flew on to Moscow, where Dehn found it necessary to consult a doctor. Three more days elapsed there before the departure of the next trans-Siberian train—an interlude that gave them time to explore the city and even attend the opera and ballet. Dehn noted that there were long lines in the stores, but that food was not rationed.

During the several days they spent crossing the “endless Russian plain”, the temperature at times fell so low that the only liquid that could be used for bathing was cologne (though hot water was available in samovars for tea), and Dehn developed a life-threatening combination of influenza and pneumonia, for which he was treated in Irkutsk. Yet in his account he dwelt hardly at all on the hardships they experienced, describing instead the grand railway station in Novosibirsk, the great Siberian rivers, frozen Lake Baikal, and “the handsome settlements...in the capital of the...[nominally] Jewish state of Birobidjan”, founded in 1934 as one of several “autonomous” states that were intended as ethnic havens for Russian minority groups but that never succeeded in attracting many settlers.

When the Dehns finally reached Vladivostok, they were forced to remain six more days while waiting for a ship to Kobe. Dehn took the opportunity to visit the Pedagogical Institute there and was surprised to find a good mathematical library, whose holdings included a text by Courant.

The crossing to Japan proved to be very rough and cramped, but the gentle climate in Kobe offered welcome relief and a chance for Dehn to recover his health. He said nothing about the subsequent voyage to San Francisco, where he and his wife arrived on New Year's Day, 1941.

Contrasting Refuges: The Institute for Advanced Study and Black Mountain College

The subsequent careers of Dehn and Gödel were markedly different, yet also parallel in certain respects. Both had difficulty securing permanent appointments, and both were supported at first through funds for refugee scholars. Gödel remained at the IAS the rest of his life, but he was not made a permanent member there until 1946. He was named a professor only in 1953 (the same year he was elected to membership in the National Academy of Sciences), after the departure of Carl Ludwig Siegel, a close friend of Dehn's who had himself found sanctuary at the IAS but who resolutely opposed Gödel's advancement there. For the first

six years Gödel's contract was renewed on an annual basis, and at one point his name was sent to the University of Wyoming as one still seeking a permanent position. But Gödel seems never to have complained about his status. The Institute gave him freedom to pursue his intellectual interests as he saw fit, without any obligation to lecture. He was not under pressure to publish, and he did so only occasionally. He also preferred not being obliged, as faculty were, to take part in matters of IAS governance; and even as a temporary member he was relatively well paid. (His annual stipend in 1940–1941 was \$4,000.)

Dehn, on the other hand, arrived penniless in Pocatello, where he was paid a salary of only \$100 per month. His teaching duties at Idaho Southern were not excessive, and he enjoyed hiking in the nearby mountains, but Pocatello was an intellectual backwater, and his short-term appointment forced him to begin searching for a position elsewhere almost immediately. He went next to the Illinois Institute of Technology, where he served as a visiting professor of mathematics. The pay was better there, but the lecture duties were more onerous, and Dehn disliked the busy Chicago urban/industrial environment. So, after only a year at IIT, he accepted a position as tutor at St. John's College in Annapolis, Maryland.

One of the oldest colleges in the United States, St. John's was distinguished by its curriculum, which focused (as it still does today) on the Great Books of western culture (based on a list of one hundred such drawn up at the University of Chicago). It was Dehn's task to teach mathematics directly from the texts of Euclid, Apollonius, Newton, etc., ending with *Principia Mathematica* (!), but he quickly realized that his students were young (most of those over eighteen having been called up for military service) and their preparation weak. Frustrated by the attempt to uphold an absurd pretense, he therefore sought yet another position.

Despite his eminence, Dehn's age (66) made it difficult for him to obtain a permanent appointment at an established institution. The Depression years, however, had spawned the creation of a few experimental academic enterprises. The Institute for Advanced Study, which began operations in 1933, was one such. Another, founded that same year, was Black Mountain College, located outside the community of Black Mountain, North Carolina, a few miles northeast of Asheville. There, in March of 1944, Dehn delivered a pair of guest lectures. And there, from 1945 until his death in 1952, he served as the sole faculty member in mathematics.

Black Mountain College was a unique institution, about which much has been written. ([4] provides a detailed history of the college, [10] is a collection of reminiscences by former students and faculty, and [12] describes Dehn's career there.) Founded

by dissident faculty who had resigned or been fired from Rollins College in Winter Park, Florida, BMC was an experimental college of the arts that began life in rented quarters (as did the IAS) and moved six years later (as did the IAS) to a permanent location nearby (in the forest on the site of a former summer camp). Like the IAS, it served as a haven for many refugees of the Holocaust, including, besides Dehn, the artists Anni and Josef Albers and Willem de Kooning; the musicians Heinrich and Johanna



Max Dehn

Jalowetz, Stefan Wolpe, and Erwin Bodky; the musicologist Edward Lowinsky; the psychiatrist Erwin Straus; the physicist Peter Bergmann; and the anthropologist Paul Leser. Also like the IAS, BMC was founded on the principle of faculty governance, which (in both cases) all too often led not to consensus but to clashes and changes of leadership. Unlike the IAS, however, BMC had no endowment, so its finances were always precarious. Students and faculty collaborated in the construction of campus facilities and the growing of crops for food, and faculty received little (and sometimes nothing at all) beyond their room and board. Dehn's initial salary there was \$40 per month. Moreover, whereas the IAS was authorized to offer degrees (but never has), BMC was never accredited. Instead, its graduates were certified through examinations conducted by outside scholars.

BMC was, in effect, an educational commune, which attracted self-reliant students seeking an alternative to a traditional college education. It was an environment in which Gödel could not have survived. Dehn, however, thrived there. In addition to mathematics he taught philosophy, Latin, and Greek, and as several student memoirs attest, he became a revered and beloved figure, remembered especially for his love of the outdoors, the impromptu natural history lessons he gave on hikes in the nearby mountains, his unorthodox approach to the teaching of philosophy (via the Socratic method), and his friendly attitude toward students, among whom were two (Peter Nemenyi and Trueman MacHenry) who went on to receive Ph.D.'s in mathematics. (For their graduations from BMC, Nemenyi was examined by Emil Artin and MacHenry by Ruth Moufang.) Nemenyi later taught statistics in Mississippi and Nicaragua, while MacHenry became a professor at York University in Canada [16, p. 133].

One might expect Dehn to have been frustrated by the paucity of serious mathematics students at Black Mountain; yet when queried about that, he

replied, "Not at all. In fact, I have been very fortunate. In my sixty years of teaching I have had at least fifteen real students" [10, p. 298].

Dehn's intellectual isolation at BMC was mitigated by two leaves of absence (for the fall semester of 1946–1947 and the academic year 1948–1949) that he spent at the University of Wisconsin in Madison. Nevertheless, he retained his attachment to Black Mountain. Indeed, among the documents preserved in the archives of the college is a letter Dehn wrote from Chicago on July 13, 1946, thanking the board of BMC for granting his upcoming leave. In it he lamented that he would "miss the flaming October and the dark and cozy time before Xmas" at Black Mountain, and he expressed the hope that when he returned there later that summer there would be "some nice work" for him to do, such as "geometry for artists or hoeing potatoes."

Remarkably, during his leaves at Wisconsin Dehn directed one final doctoral student: Joseph Engel, who later became prominent in the operations research community. In an unpublished memoir about Dehn [5], Engel describes him as "small and frail", "an idealistic man" distinguished by "his inner peace, ...good humor, and innocence." Engel recalls how, on one occasion, following a very informal final examination that took place at the University of Wisconsin *Ratskeller*, Dehn suggested they walk across the frozen Lake Mendota. As they did so, Engel "noticed that the wind had built up a small ice barrier bordering the shoreline," and he warned Dehn, "Be careful crossing that ice." Dehn, however, ignored the warning. "He fell through the ice...[and] was in water up to his waist." His small size enabled the accompanying students to "grab...him under the armpits and yank...him out," but he was soaked, and it was bitterly cold. "To keep him from freezing" the students "made him walk briskly back to the nearest building"—and all the while Dehn "continued to chat...in his usual cheery and benevolent manner."

Engel goes on to say that "Working under [Dehn's] kind and understanding guidance was a joy and a privilege. ...Looking back at that wondrous time, I still love him, and am in awe of his wisdom and humanity and humor and compassion."

Final Years

By the time of their emigrations, the greatest works of both Gödel and Dehn were behind them. Both, however, continued to publish works of substance. Gödel's interests turned increasingly to philosophy and, for a time, to relativity theory. During the 1940s he contributed important essays on Russell's mathematical logic and Cantor's continuum problem, and in 1949 he published the first of three papers in which he described his discovery of radical solutions to Einstein's field equations of

gravitation (rotating universes, in some of which time travel was possible). In December 1951 he delivered the prestigious Gibbs Lecture to the American Mathematical Society (concerning some philosophical implications of his incompleteness theorems), and in 1958 he outlined a consistency proof for arithmetic (originally obtained in the period 1938–1941) based on the notion "computable functional of finite type". After that, apart from revisions to earlier papers, he published no more and became increasingly reclusive. During the 1960s and early 1970s he was awarded several honorary degrees and memberships, and in 1975 he received the National Medal of Science. By then, however, his physical and mental deterioration had progressed to an alarming degree. He retired from the IAS in 1976 and died two years later of self-starvation.

As for Dehn, in the years 1943 and 1944 he published a series of five historical articles in the *American Mathematical Monthly*. In 1947 he contributed a short paper "On the approximation of a function by power series" to the pedagogical journal *The Mathematics Student*. And in 1950 his last publication, "Über Abbildungen geschlossener Flächen auf sich" appeared in a Norwegian journal.

According to the obituary memoir [9], "After the end of the war, [Dehn] immediately resumed his contacts with his German friends" and "inaugurated a magnanimous relief program for his former Frankfurt colleagues." In June of 1952 he retired from Black Mountain College as Professor Emeritus, with the expectation that he would continue to "serve as an advisor and...live on the campus" [12]. Hartner reports that he also "planned [to] return to the University of Frankfurt" in the winter of 1953. But it was not to be. For on July 27, 1952, apparently as the result of his over strenuous efforts the previous day to protect some beloved trees from being cut down by loggers, Dehn developed a coronary embolism and died. He was buried in the woods at a spot marked by a stoneware tablet made in the college's pot shop. (His wife Toni lived on to become a centenarian, and following her death in 1996 her ashes were buried at the same site.)

Black Mountain College itself survived only four years beyond Dehn's death. Unable to raise funds for its continued operation, it closed abruptly in 1956. Its buildings were sold to pay its debts, and the site reverted once again to a summer camp.

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Dehn, for her reply to my inquiries about her father.

Sources

Archives

Max Dehn's papers are held by the Archive of American Mathematics at the Center for American History in the library of the University of Texas at Austin. Some additional materials are held in a file at Idaho State University, Pocatello, in the care of Professor Linda Hill. Correspondence concerning Dehn's employment at Black Mountain College is included among records of the college held by the North Carolina State Archives, Raleigh.

Kurt Gödel's *Nachlaß* is held by the Institute for Advanced Study, Princeton, and is available to scholars as Collection 282 in the manuscript division of the Firestone Library at Princeton University. A microfilm edition of the papers, excluding correspondence, is available for purchase from IDC Publishers, Inc., 350 Fifth Avenue, Suite 1801, New York, NY 10118 (Web address: <http://www.idc.nl>). A catalog of the papers is forthcoming in volume V of Gödel's *Collected Works*.

Note: The photograph of Max Dehn was reprinted with permission from *History of Topology*, I. M. James, ed., "Max Dehn", pages 965-78, 1999, with permission from Elsevier Science.

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