

Dirk Struik Celebrates his 100th

On September 30, 1994, a brilliant autumn day on the Brown University campus, Dirk J. Struik celebrated his 100th birthday. How does a hundred-year-old mathematician mark such an auspicious occasion? He does what comes naturally—he gives a lecture.

Struik's centenary lecture, sponsored by Brown, Providence College, and the AMS, was the brainchild of Brown mathematician Thomas Banchoff. Struik is known as much for his work in the history of mathematics as for such important works as *Lectures in Classical Differential Geometry*. In remarks before Struik's lecture, Banchoff said this book had changed his life. "The book is unique in that it's filled with marvelous illustrations and with marvelous historical comment, so that you get the idea that mathematics is visual and it's in context," Banchoff remarked. "And that's what we're really celebrating today."

Indeed, the day's events—starting with the afternoon lecture and wrapping up with after-dinner speeches and birthday cake—focused on mathematical personalities, Struik's included. The lecture attracted mathematicians, historians, and other academics from Rhode Island and other New England states as well as from across the United States and Canada. But the prize for long-distance travel probably goes to ethnomathematics guru Ubiratan d'Ambrosio, who flew up from Brazil to attend the lecture and dinner.

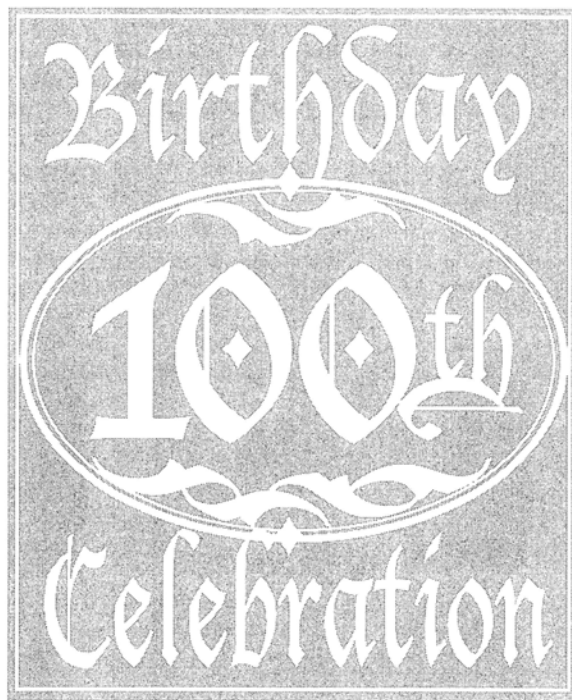
Struik's prominence as a mathematical historian was reflected in remarks of Joan Richards, a science historian at Brown. She recalled that when she first enrolled in a history of science class at the Massachusetts Institute of Technology in 1974, the class celebrated Struik's eightieth birthday. Since then, Struik has been an important influence in her work. "He has always

been interested in social history, the way mathematics and mathematical ideas have interacted with the cultures in which they are born and develop," she noted. "This has been rela-

tively unusual in the context of the history of mathematics, and, in my case, because I was first introduced to the field by Struik, I didn't realize how unusual it was. I have found in the subsequent twenty years, that time and time again, just when I think I'm on the verge of some great, new, revolutionary idea, someone says, "Have you read the article by Dirk Struik?" "

Struik has also written about the history of science. His book *Yankee Science in the Making*, published in 1948, is one of the first to describe the development of science in the United States. Struik, who moved to this country from Europe in 1926 to take a position at MIT, had to consult a map to be sure of where Massachusetts was. But then, noted Richards, he "became, as he has a way of doing, so involved, so knowledgeable, that within a couple of decades he was able to recognize not only American culture in general, but that there is such a thing as Yankee culture," not to mention Yankee science.

Born in Rotterdam in 1894, Struik was inspired in mathematics in part by his father, who taught mathematics and also loved history. After studying at the University of Leiden, Struik worked for a brief time as a high school teacher. He went back to the university and received his Ph.D. in 1922 under the supervision of the geometer W. van de Woude; he was also an assistant to J. A. Schouten at the Technische Hoogeschool in Delft between 1917 and

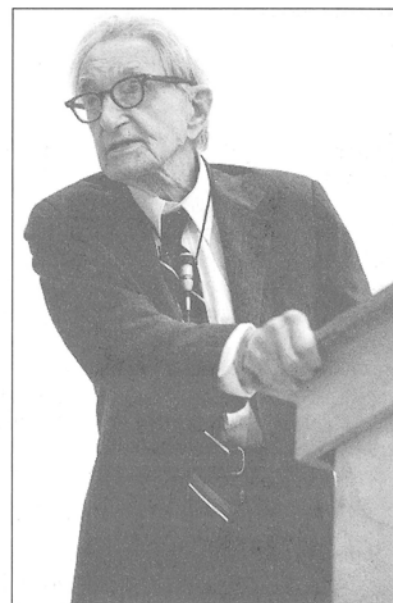
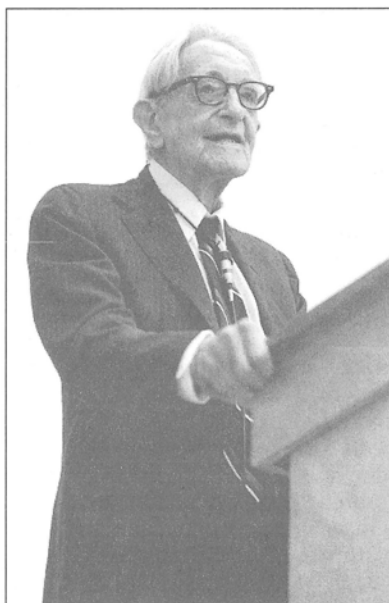
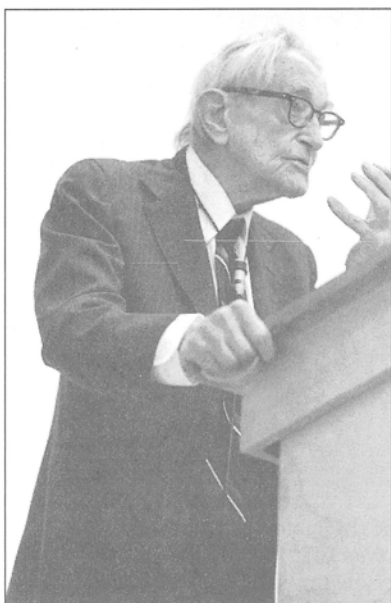


1924. In 1923 he married Ruth Ramler, a mathematician who had received her Ph.D. from the University of Prague in 1919 (she died in 1993 at age ninety-nine). After working at the University of Rome and at Göttingen University, Struik was persuaded by Norbert Wiener to come to MIT.

Struik's Marxist views got him into trouble in the 1950s, a time when many academics—including mathematicians Chandler Davis and Lee Lorch, both of whom attended the Struik birthday celebration—came under the shadow of the notorious House Un-American Activities Committee (HUAC). Asked about this period of his life in the question session after his lecture, Struik said in exasperation, "Oh, stop talking about that time." His irritation might have stemmed from an article that had appeared that day in the *Boston*

MIT suspended Struik with pay for four years. Politicians ran on the slogan "Prosecute Struik" and there was an abortive attempt to burn down Struik's house, but the trial never came to pass and eventually died from public view.

By 1955, Struik was back in the classroom, teaching mathematics. But his troubles were not quite over. Upon retirement at age sixty-five, MIT professors can apply for year-by-year extensions of teaching duties until age seventy. MIT turned down Struik's application. At other universities across the country, he encountered similar problems. "Invariably the mathematics faculty was glad to have me. Invariably the



John Forasté/Brown University

Globe carrying the headline, "At 100, a Marxed man: Red Scare target at MIT back in the spotlight". The article focused exclusively on the political angle and barely mentioned Struik's main lifework in mathematics and history.

Struik himself tells the story of his brush with McCarthyism in an article, "The Struik Case of 1951", published in January 1993 in the *Monthly Review*. Giving readers a goodly dose of Struikian wit, the article chronicles his tribulations in an atmosphere "half reminiscent of Nazi Germany, half of Alice in Wonderland". Struik actively supported such causes as that of Loyalist Spain against Franco and the development of trade unions, causes that by the 1950s were deemed "heretical and 'un-American'". Testimony by Herbert Philbrick, who at the time specialized in informing the FBI about American Communists, led to a subpoena for Struik to appear before HUAC. Taking the Fifth Amendment in his testimony, Struik emerged relatively unscathed, but shortly thereafter the State of Massachusetts charged him with conspiring "to advocate, advise, counsel, and incite the overthrow by force and violence of the Commonwealth of Massachusetts". Under pressure,

administration refused. My teaching days in the United States were clearly over." In his after-dinner remarks, Lee Lorch noted that Struik's family suffered as well; in particular, his daughter, Ruth Rebekka Struik, now a mathematics professor at the University of Colorado at Boulder, was denied fellowships at graduate school because of her father's background.

In his centenary lecture, Struik looked back at some of the mathematicians he has known in his long career. David Hilbert, said Struik, was an inconspicuous presence, "you might take him for a bank teller or something like that", though he could be formidable in the classroom and in his seminar. "He was one of the last ones in command of the whole of mathematics," from number theory to integral equations to foundations, and he also had a strong interest in applications, especially physics. Struik recalled one time when a speaker in Hilbert's seminar described a certain theorem. Hilbert stood up and

said what a beautiful theorem it was, "*wunderbar schön*", and asked where the speaker had found the theorem. The speaker replied, "But Herr Professor, it is your own theorem!"

Another mathematician who had an influence on Struik was Tullio Levi-Civita. Levi-Civita worked in the Italian tradition, using pure mathematics in applications, especially mechanics. He encouraged Struik not to keep working in the same area but to branch out and try something new. He gave Struik a problem in hydrody-

namics, investigating the behavior of waves in canals of finite depth. (Later on, said Struik, his results were tested at The California Institute of Technology, "and the waves obeyed my equations—very nice".) The mathematical community in which Levi-Civita worked was far more courteous and genteel than that of Hilbert's Göttingen, where the mathematicians "always liked to make little jokes about each other".

Unlike Hilbert and Levi-Civita, who had a variety of mathematical interests, J. A. Schouten "went out from one center"—vector analysis. Struik learned the field from Schouten, complete with the cumbersome notation that Schouten had developed, and wrote his dissertation on Riemannian geometry. The trouble was, no one could read the dissertation because no one else understood the notation, which was a maze of hooks and double hooks and crosses and circles. Eventually they came upon the 1901 paper of Ricci and Levi-Civita, which established the notation of "absolute differential geometry", now called tensor calculus. Struik noted that this paper had gone unnoticed until 1912, when Einstein was looking for a way to express his theory of gravitation. When Struik and Schouten used the Ricci-Levi-Civita notation in their papers, people finally began reading them.

Struik met Wiener when they were studying together in Göttingen, and, having just finished a Rockefeller fellowship with no other prospects open, Struik took up Wiener's offer to go to MIT. According to Struik, Wiener alternated between exhilaration when he had good ideas, and deep depression. When his work was going well, he wanted to tell everyone about it: he would go on "safaris" in the corridors of MIT, where he would buttonhole anyone who would listen. He could



speak Chinese, so he even buttonholed the Chinese students. Wiener was concerned about the social responsibilities of scientists. When asked to join the War Department, he wrote his famous article in the *Atlantic Monthly* saying that he would never do anything that would help to kill people.

Struik met Emmy Noether in 1925 in Germany. She had two handicaps, he noted: being a woman, and being Jewish. Hilbert protected her to some extent, and she was

very prominent in his seminar, but eventually she was forced to flee Germany when Hitler came to power. "MIT, I'm ashamed to say, did not offer her a job," said Struik, and she ended up going to Bryn Mawr College, where she died not long thereafter. Struik recently found some letters from Emmy Noether in his collection and sent them to Alice Schafer of Marymount University, who is working on a biography of Noether.

Later that evening, after the singing of "Happy Birthday" and the cutting of the cake, which had been fashioned to form huge numerals "100", Schafer was among the many who paid tribute to Struik in after-dinner remarks. The familial charm of the evening was heightened by the presence of six of Struik's ten grandchildren and all of his great-grandchildren, as well as by a group of Banchoff's undergraduate students, who showed a videotape they made especially for this event. The videotape presents an intriguing animated look at the "Temple of Viviani", one of the shapes that appears in Struik's well-known differential geometry book, and takes viewers on a fascinating ride through the Klein bottle.

The after-dinner speakers included several from the mathematical community as well as a number of Struik family members and a Rhode Island member of the Sherlock Holmes Society, of which Struik is a member. Former AMS President Michael Artin of MIT presented Struik with an honorary certificate from the AMS, which entitles him to distinguished lifetime membership, and Florence Fasanelli of the MAA presented a similar honor from that organization. Lee Lorch seemed to sum up the admiration the celebrants felt for Struik when he said, "We have much to thank Dirk for—his scientific accomplishments and his recognition and promotion of mathematics for the way it arises and contributes to human experience."

—Allyn Jackson