

GREENFIELD, Bella (Manel). October 13, 1915–April 3, 2010.

HUNTER COLLEGE (BA 1935), COLUMBIA UNIVERSITY (MA 1936), NEW YORK UNIVERSITY (PhD 1939).

Bella Manel was born in New York City, the only child of Tillie (1887–1971) and Jacob Manel (1882–1956). Both of her parents were born in Poland, and they were married there in 1911 before immigrating to the United States in 1914. In 1930 the family was living in the Bronx, and her father worked for a dress manufacturer.

Manel graduated from Morris High School in the Bronx in 1931 and was recognized as one of the twelve most distinguished in scholarship of the more than 400 graduates of the school. She entered Hunter College in the fall and was elected to Phi Beta Kappa during her junior year. While at Hunter most of Manel's work in mathematics was taken with [Mina Rees](#), and the two remained friends over the years. At the Hunter College graduation ceremonies in June 1935, the Joseph A. Gillet scholarship of forty-five dollars for proficiency in mathematics was divided equally between Manel and another Hunter student. Manel graduated summa cum laude. Manel then studied at Columbia University and received her master's degree in 1936 with a thesis directed by Joseph Fels Ritt on Weyl's foundation for the theory of functions.

In the fall of 1936, two years after Richard Courant's arrival in the United States, Bella Manel began her studies at New York University and served as receptionist and secretary for Courant. Constance Reid, in her biography of Courant, quotes Manel as recalling, "After I gave my first report in the seminar, his attitude toward me changed completely. I was accepted then and asked to lunch with him and the other students" (p. 188). In the spring of 1937 Manel received a Blumenthal fellowship and was able to give up her secretarial position with Courant. She held the fellowship for two years and wrote her dissertation under the direction of Courant on an aspect of Plateau's problem, a problem with which he had been involved for a number of years. She received her PhD in 1939 with a physics minor.

On March 6, 1938, Bella Manel married Max Shiffman (1914–2000), a fellow student of Courant. Shiffman was born in New York City and earned a bachelor's degree and a master's degree from City College of New York before receiving his PhD from NYU in 1938. He then served as instructor in the evening session at City College 1938–39 and as instructor at City College until 1942. During this period Bella Shiffman published her dissertation and a related paper, both under the name Bella Manel. The related paper was coauthored with Courant and her husband. The Shiffman's first child, Bernard, was born in June 1942.

During World War II and for a period thereafter, Max Shiffman was a research mathematician mainly working for the Applied Mathematics Panel of the Office of Scientific Research and Development at New York University. The Shiffman's second child, David, was born in November 1945. In 1946 Max Shiffman was appointed associate professor at New York University. He was then hired as full professor at Stanford University in 1948. According to the 2003 obituary by Peter Lax, Max Shiffman suffered the first of two schizophrenic breakdowns in 1951, with a second occurring in 1956.

In 1954 Bella Shiffman joined the Ramo-Wooldridge Corporation (later TRW Inc.) in Hawthorne, California, south of Los Angeles. She described some of her responsibilities on the curriculum vitae prepared after her retirement. From 1954

to 1956 she “hired, trained and supervised a desk calculator section [that] performed all the space technology computations for the newly formed company before the digital computer was installed. [Her] group then acted as an adjunct to the computer center.” From 1956 to 1958 she “worked with the designers of special purpose digital computers by doing the experimental programming during the design stages and by devising the machine language. [She] developed a method of programming the RW-30 airborne computer which did not have random access memory. [She] developed a testing technique for checking out the RW-300 computer as well as devising the machine language for this desk size digital computer.” She and Max Shiffman were divorced in February 1957.

On June 8, 1958, Bella Manel Shiffman married Emanuel Kotkin. Kotkin, a widower, was born in 1897 in London, England, and immigrated to the United States in his late teens. He was the president of a manufacturing plant at the time of their marriage. According to his family, Emanuel Kotkin had no middle name but often used “E” as a middle initial for business purposes. He used the name Emanuel Ernest Kotkin on his World War I draft registration card.

From 1959 to 1965 Bella Kotkin worked for the Rand Corporation in Santa Monica, California, as mathematician on the professional staff and later as consultant. She worked closely with Richard Bellman, and together they, along with others, produced a number of papers and technical reports; the technical reports included both research papers and working papers, which were called research memoranda. Bella Kotkin “worked on applications of mathematics and computers to medicine, [which] involved simulating biological experiments by computer solutions of mathematical models of cancer chemotherapy and other biological systems” (Greenfield curriculum vitae). Her work continued to be cited into the 1990s.

After 1965 she “took time out from her professional career to spend time with [her] husband, who was recovering from serious surgery, and to spend time with [her] ailing mother. During this period [she] spent a few years doing volunteer work, sometimes full time, in the area of human relations. Finally, the terminal nature of [her] husband’s cancer condition prompted [them] to move to northern California near Stanford” (Greenfield curriculum vitae). During the academic year 1980–81 she was professor of mathematics and acting chairman of the department at the College of Notre Dame in Belmont, north of Palo Alto.

Emanuel Kotkin died May 31, 1981, and Bella Kotkin returned to Los Angeles that year. During 1982–84 she taught part time in the mathematics department at the University of California, Los Angeles. On September 17, 1984, she married Moses A. Greenfield, a medical physicist whose wife had died two years earlier. He was professor emeritus in the Department of Radiological Sciences of the School of Medicine at UCLA. Moses Greenfield was born in 1915 in New York City, earned a bachelor’s degree from the City College of New York, and earned a master’s degree in 1937 and a PhD in 1941 from New York University. He served as director of the biomedical physics graduate program at UCLA from 1960 until his retirement in 1982 and again during 1992–95. After her own retirement, Bella Greenfield devoted herself to music as a classical pianist and to her family.

In 1995 Moses Greenfield established the Bella Manel Prize for outstanding graduate work by a woman or other member of an under-represented group at the Courant Institute at New York University. Bella and Moses Greenfield lived in Los

Angeles until 2007, when they moved to Baltimore, where her son Bernard Shiffman was professor of mathematics at Johns Hopkins University. In 2010 Bernard Shiffman informed the authors that Moses Greenfield had developed Alzheimer's disease several years earlier and that his mother had cared for her husband until July 2009, when it became too difficult for her. Bella Greenfield died on April 3, 2010, at age ninety-four and was buried in the Baltimore Hebrew Cemetery. She was survived by her husband, children, grandchildren, and great-grandchildren.

Organizational affiliation: Phi Beta Kappa.

Thesis and dissertation:

1936 [Manel, B.] An analysis of Weyl's foundation for the theory of functions. MA thesis, Columbia University, directed by Joseph Fels Ritt.

1939 [Manel, B.] Conformal mapping of multiply connected domains on the basis of Plateau's problem. PhD dissertation, New York University, directed by Richard Courant. Typescript. Printed version, 1942, reprinted from *Univ. Nac. Tucumán Revista A* 3 (1): 141–49.

Publications:

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1942 [Manel, B.] The conformal mapping of multiply-connected domains on the basis of Plateau's problem. *Univ. Nac. Tucumán Revista A* 3 (1): 141–49. Published version of PhD dissertation. Reviews: *MR* 4,217a (E. F. Beckenbach); *Zbl* 61.15601 (J. Gorski).

1958 [Shiffman, B.] Minimum time programming on a drum computer. In *1958 Institute of Radio Engineers (IRE) National Convention Record*. Vol. 6, Part 4, 327–29. New York: Institute of Radio Engineers. Presented to the IRE, New York City, 27 Mar 1958. Abstract: *Proc. IRE* 46:653 #49.5.

1962a [Kotkin, B.] with R. E. Bellman. On the numerical solution of a differential-difference equation arising in analytic number theory. *Math. Comp.* 16:473–75. Reviews: *MR* 26 #5756 (Authors' summary); *Zbl* 106.10602 (R. Ansorge). Also appeared as RAND Research Memorandum RM-2891-PR, 1962. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-147. Originally issued November 1961, revised February 1962.

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1963b [Kotkin, B.] A mathematical model of drug distribution and the solution of differential-difference equations. In *Proceedings of the IFIP Congress 62* edited by Cicely M. Popplewell, 145–48. Amsterdam: North-Holland Publishing Co. Review: *Inform. Process. J.* 1 #2514. Presented to the International Federation for Information Processing (IFIP) Congress, Munich, Germany, Aug 1962. Also appeared as RAND Research Memorandum RM-2907-RC, 1962. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-148. Abstract also appears in *Sel. Publ. Rand Corp.* 1 #681.

1963c [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. Polynomial approximation—A new computational technique in dynamic programming: Allocation processes. *Math. Comp.* 17:155–61. Reviews: *Inform. Process. J.* 2 #6296; *MR* 28 #3527 (M. L. Balinski); *Zbl* 123.37303 (S. Vajda). Also appeared as RAND Research Memorandum RM-3084-PR,

1962. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-156. Review: *Inform. Process. J.* 1 #3169.

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1964b [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. Differential approximation applied to the solution of convolution equations. *Math. Comp.* 18:487–91. Reviews: *Inform. Process. J.* 3 #9669. *MR* 29 #2977 (H. Oser); *Zbl* 131.14602 (J. Kuntzmann). Also appeared as RAND Research Memorandum RM-3601-NIH, 1963. Abstract: *Sel. Publ. Rand Corp.* 1 #104. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed.*, 1963–1972, 332.

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“Convolution equations and differential approximation” to the Second Annual Symposium on Biomathematics and Computer Sciences in the Life Sciences, Houston, TX, May 1964.
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Reference to: “Bella Manel Greenfield.” (Death Notice) *Baltimore Sun*, 12 April 2010.

Other sources: Authors’ questionnaire 1998; Dr. Bella Greenfield undated curriculum vitae sent to author 1998; private communication with Bella Greenfield 1998; private communication with son Bernard Shiffman 2010; Constance Reid, *Courant in Göttingen and New York* (New York: Springer-Verlag, 1976); Peter D. Lax, “Max Shiffman (1914–2000),” *Not. Amer. Math. Soc.* 50 (2003): 1401; US Census 1930 NY.

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