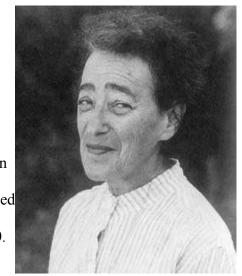# Olga Taussky-Todd

Olga Taussky-Todd (August 30, 1906 – October 7, 1995) was one of the 20th century's leading mathematical theorists. With her some 300 papers, she had a profound influence on both pure and applied mathematics, making significant contributions to algebra, number theory and matrix theory. She did much of the fundamental work on Hilbert's 19th problem on the sums of squares, for which she received the Ford Prize of the Mathematical Association of America in 1950. Her students and colleagues agreed that she was a gifted teacher, with a rare talent for stimulating the intellect of others. In her role as editor of several leading mathematical journals, she had a major impact on the direction of mathematical research.

Olga Taussky was born in Olmütz, then part of the Austro-Hungarian Empire, now known as Olomouc in the Czech Republic. Her father was an industrial chemist. When she was three years old the family moved to Vienna where they stayed until 1916, when they relocated to Linz, where her father directed a vinegar factory. Because of WWI, life was harsh, and the family was often near starvation. From an early age, Taussky had considerable interest in grammar, writing essays and composing poems and music. Her growing ability in mathematics was demonstrated when her father challenged her to find a solution of the problem of the proportion of water to be added to the vinegar his company produced to be at the acidity level required by statute. The problem was an example of a Diophantine equation, for which she produced a table that the workmen could use in mixing quantities of vinegar and water. During her final year of high school, she wrote her first mathematical paper, an essay called "From the binomial to the polynomial theorem," which described Pascal pyramids of all dimensions.

In 1925 Taussky entered the University of Vienna to study chemistry, but realized her real passion was mathematics. Among her classmates was Kurt Gödel, whom she recalled could talk extensively on any area of mathematics; and she considered their discussions rare intellectual pleasures. She received her doctorate in 1930 for a thesis in algebraic number theory, directed by Philipp Furtwängler. Shortly thereafter Richard Courant invited her to serve as an assistant at the prestigious Mathematisches Institut in Göttingen. There she helped edit the first volume of David Hilbert's complete works on number theory. In 1932 the growing political tension made it inadvisable for a Jew to stay at Göttingen, however, so after completing her assignment she returned to Vienna to work in the area of functional analysis with Hans Hahn and Karl Menger, who arranged for her to be given a small assistant position at the university.

By 1934 Taussky lost her post because of the Nazis in Germany and their influence in Austria. She received a fellowship that allowed her to travel to Bryn Mawr College in the United States, where she collaborated with Emmy Noether. Prior to going to the United States, she had applied for a fellowship at Girton College, Cambridge. It wasn't until after she agreed to the Bryn Mawr position that she learned she was awarded a three-year fellowship at Girton. She was allowed to spend the first year of the fellowship at Bryn Mawr and at the end of the academic year she moved to England. Her interview for the position there would never have been conducted in the same manner if the candidate had been a man. A member of the committee asked: "I see you have written several joint papers. Were you the senior or the junior author?" G.H. Hardy, another member of the committee interjected, "That is a most improper question. Do not answer it." She was also asked, "I see you have collaborated with some men, but no women. Why?" She replied that was why she was applying to a woman's college at Cambridge. The senior female mathematician at Girton advised the women students not to do theses with Taussky, because it would be damaging to their careers to have a female supervisor.

In 1937 Taussky accepted a position at Westfield College, one of the women's colleges at the University of London where she taught nine courses a week. Her difficulties with the English language made her work even more arduous, as the other faculty members were not too friendly to a foreigner. At an intercollegiate seminar she met her husband-to-be, Belfast-born John (Jack) Todd, who held a position similar to hers. The couple married in 1938, and although over the next 58 years they collaborated on only a few papers, because she was an algebraist and he was an analyst; they discussed each other's work, and greatly influenced one another. At the beginning of WWII the pair was in Belfast, where Taussky-Todd lectured at Queen's University and began to focus her mathematical attention on generalizations of matrix commutativity and integral matrices. This field, which did not exist in the 1930's, occupied her attention for most of her career. In 1947 the couple moved to Washington D.C. and took positions with the National Bureau of Standards Applied Mathematics Laboratory. In 1955 they both took leave for a semester to teach at the Courant Institute of Mathematical Sciences at NYU.

In 1957 Jack and Olga accepted appointments at the California Institute of Technology. Because of California's nepotism laws, Todd's appointment was as a professor and hers as a research associate. Despite this unfair distinction, they had similar duties, and adjacent offices of the same size. She conducted seminars and directed fourteen doctoral dissertations, with most of her students making important contributions to matrix theory. In 1964 the *Los Angeles Times* named Olga Taussky-Todd woman of the year. The next year both the Todds were appointed Fulbright Visiting Professors at the University of Vienna. In 1969 the press made quite a fuss about a woman who had just been appointed as an Assistant Professor of English, claiming she was the first woman to be appointed to Caltech's faculty. This was too much for Olga. She went to the administration to have her rank altered, and in 1971, she was made professor emeritus. Taussky-Todd did not accept the notion of retirement,

observing, "I was 'retired,' a phrase I absolutely abhor. Nobody, absolutely nobody, ought to be burdened with it, unless by fate or by oneself."

About this time, the *Journal of Number Theory* published a book edited by Hans Zassenhaus, *Algebra and Number Theory*, which was a technical survey of some of her work. She served as Vice-President of the American Mathematical Society in 1986-1987, was an editor of the *Bulletin of the American Mathematical Society* and the founding editor of *Linear Algebra and Its Applications*. In 1993 the International Linear Algebra Society established a lecture series to honor the contributions the Todds had made to the field of linear algebra. She died peacefully in Pasadena, California at the age of 89, of complications of a broken hip. She was survived by her husband.

Quotation of the Day: "I did not look for matrix theory. It somehow looked for me." – Olga Taussky-Todd