

# Giants of Science

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## Wanda Szmielew

SZMIELEW, Wanda (5 April 1918, Warsaw - 27 August 1976, ibid.), Mathematician. Daughter of Dawid Montlak and Bronisława Badrach (in 1937 she married B. Szmielew).

She obtained her high school diploma in 1935 at the J. Kochanowski Commune Gymnasium in Warsaw and began studying mathematics at the Faculty of Mathematics and Natural Sciences of the University of Warsaw, which was interrupted by the outbreak of World War II. She obtained her first scientific result in 1938 concerning the axiom of choice for finite sets (*On Choices from Finite Sets*, 'Fundamenta Mathematicae' 1946). During the war, she worked as a measurer at the National Measurement Office and was involved with secret teaching.

In 1945 she studied mathematics at the Łódź University. After graduation she resumed studies at the University of Warsaw, and after submitting her master's thesis entitled *On Completeness of the Theory of Abelian Groups Without Cyclic Elements* in 1947 she obtained a master's degree.

From 1945 to 1947 she was an assistant and a senior assistant at the Łódź University of Technology and Łódź University and at the University of Warsaw from 1947 to 1950.

In 1949, at the invitation of the University of California, she went to Berkeley, California, where for over a year she was a lecturer while preparing her doctoral dissertation under the supervision of A. Tarski. At Berkeley in 1950, she got her PhD on the basis of paper entitled *Arithmetical Properties of Abelian Groups* ('Fundamenta Mathematicae', 1954). In the years 1958, 1960, 1965, and 1967 she conducted research, or gave lectures at the University of California, but for no more than two semesters.

In 1954 she became an associate professor, and in 1967 an associate professor at the Department of Geometry at the faculty of mathematics and physics at the University of Warsaw. In 1963–64 she managed it as a substitute for K. Borsuk. In the early 1970s she headed the General Section of the Institute of Mathematics at the Faculty of Mathematics and Mechanics of the University of Warsaw.

In 1958 a research seminar was established in the Department of Geometry, known around the world as the Sz. Centre of the Warsaw School of the Basics of Geometry. From 1958 to 1962 she worked as an associate professor at the Institute of Mathematical Sciences of the Polish Academy of Sciences. In 1972 she was a guest of Humboldt University in Berlin.

As she noted in her CV from 1955, 'I started my political and social work in 1933, joining the Communist school organisation called RZMS [Polish Socialist Youth Union]. At the University, I was a member of Życie [Union of Independent Socialist Youth Życie] and KZM [Communist Youth Union]. In 1942 I joined the Polish Workers Party; in 1948 I joined the Polish Workers Party, of which I am a member until now'. She belonged to the Polish United Workers' Party until 1959.

She was decorated with the Medal of the 10th Anniversary of People's Republic of Poland (1955) and the Knight's Cross of the Order of Polonia Restituta (1973).

Sz. is the author of about 30 publications being the foundations of mathematics. She obtained the results from the basics of algebra, the basics of geometry and set theory. Her doctoral thesis, in which she proved the decidability of the Abelian group theory, brought her widespread recognition. In terms of researching the foundations of geometry, the results were presented in a series of works on hyperbolic and absolute geometry: *Some Metamathematical Problems Concerning Elementary Hyperbolic Geometry* (Proceedings of the International Symposium on the Axiomatic Method, Berkeley 1958), *Absolute Calculus of Segments and its Mathematical Implications* ('Bulletin de l'Académie Polonaise des Sciences et des Lettres', 1959, No.

7). For the above-mentioned publications she received the scientific award of the 3rd Department of the Polish Academy of Sciences in 1960. K. Borsuk, in the justification of the application for the award, wrote, 'By defining a certain simple but ingenious calculus on sections, she introduced a new geometric algorithm on the basis of hyperbolic geometry, replacing Hilbert's classic *Enden-Rechnung* entirely, but being much simpler and more natural. The second important research result [...] is to introduce line calculus on the basis of absolute geometry [...] in a way that includes as special cases the ordinary segmental calculus of Euclidean geometry and the previously introduced segmental calculus of hyperbolic geometry.' The above-mentioned publication and *New Foundations of Absolute Geometry* ('Methodology and Philosophy of Science', 1962) contain the algebraic basis for the uniform coordination of Euclidean and hyperbolic geometry. Her paper entitled *A New Analytic Approach to Hyperbolic Geometry* ('Fundamenta Mathematicae', 1961, vol. 50,) concerns the classic problem derived from Hilbert of the internal coordination of hyperbolic geometry, in which she provided a solution simpler than Hilbert's. Together with K. Borsuk, she wrote a monograph entitled *The Basics of Geometry* (1955). In the papers that were published after her death, 'Fundamenta Mathematicae', 1980, and 'Dissertationes Mathematicae', 1981, she gave the theory of hyperplanes in  $n$ -dimensional affine geometry.

The publications from the years 1970–74 were devoted to the basics of Euclidean geometry on the basis of new system of Szmielew-Tarski axiomatics. In her research, she sought to find connections between algebra and geometry, which in turn leads to a stronger and simpler expression of the studied geometric theories.

She is considered to be the founder of the Warsaw school of the basics of geometry.

After her death, other monographs were published: *From Affine to Euclidean Geometry. Considerations on Axiomatics* (with an introduction by M. Moszyńska, Biblioteka Matematyczna 55, Warsaw 1981), *Metamathematische Methoden in der Geometrie* (co-authors W. Schwabhäuser, A.

Tarski, Springer-Verlag, Berlin, 1983).

In the memories of her co-workers and students, her creative passion, perseverance, sensitivity to others, and extraordinary ability to organise her and her students' work were emphasised.

She used the pseudonyms Wanda Gawrońska (1940–41) and Wanda Kowalska (1941–45).

PSB (S. Domoradzki); SBMP (Z. Pawlikowska-Brożek); Duda.

A. Burdman, S. Feferman: *Alfred Tarski. Życie i Logika*, Warsaw 2009; 'Studia Logica', 1977, Vol. 36, No. 4 (M. Kordos, M. Moszyńska, L.W. Szczerba); 'Wiadomości Matematyczne', 1978, vol. 21, No. 1 (M. Kordos, M. Moszyńska, L.W. Szczerba).

Stanisław Domoradzki

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