Wacław Sierpiński

VENCESLAO SIERPIŃSKI

in memoriam

Wacław Sierpiński (1882–1969)

by

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Wacław Sierpiński was born in Warsaw on March 14, 1882. His father Konstanty Sierpiński was a renowned physician. In his early youth Sierpiński was pupil of the 5th Gimnasium in Warsaw, one of the best schools of the period; a number of his colleagues became later scholars of eminence.

Already in early youth he gave evidence of his public spirit when, together with a few friends from his secondary school he organized secret courses for boys who could not afford to go to school. Under the influence of his mathematics teacher, W. Włodarski, who was an outstanding pedagogue, Wacław Sierpiński began to show considerable interest in mathematics for which he posessed inborn ability.

In 1900 Sierpiński entered the University of Warsaw, then a Russian institution (this period was prior to the boycott of the University by Polish youth). There he came under the influence of the great expert on number theory, G. Voronoï, and this determined his interests for the next dozen years or more. Already at that time, as a university student, he stood out among his felow students for his mathematical talent. This was confirmed by the prize (a gold medal) he won in 1903 in a competition within the Department of Physics and Mathematics. The same year, he graduated from the University with the degree of "candidate of sciences" and took up work in a secondary school (for this was the most frequent lot of young scientists at that time).

The subsequent development of his career was a result of political events. Sierpiński participated in the great school strike connected with the 1905 revolution, resigned his school and moved to Cracow. He passed the required examination in Cracow's Jagiellonian University and in 1906 received the degree of Doctor of Philosophy.

Then he returned to Warsaw and to secondary education which, in the meantime, had received permission to teach in Polish. He also lectured at "Scientific Courses" which were in a way an unofficial Polish university (the official university was the Russian one, boycotted by young Poles). He also did research work and published the results of his studies in the major scientific periodicals in Warsaw and Cracow.

In 1908 Sierpiński was elected a member of the newly created Warsaw Scientific Society. In the same year he received the title of Assistant Professor in the Jan Casimir University in Lwów and two years later he was appointed Associate Professor in the same university.

In that period, more or less, a change occured in Professor Sierpiński's mathematical interests. He passed from number theory, in which he had achieved very fine, and even classic results, to set theory. In this field Sierpiński's talent flourished as vigorously as ever.

From 1909 on he systematically lectured on this field of mathematics, which grew in importance year by year although more as a compilation of results by individual scholars than a monolithic and harmoniously built theory. The transformation of this discipline into a systematized theory is largely due to Sierpiński. His *Zarys teorii mnogości* (An Outline of Set Theory) published in 1912 (based on a textbook written in 1909), is one of the first synthetic formulations of this theory in the world.

In that period Sierpiński did not confine himself to creative research. Taking into account the needs of the students he wrote university manuals of a high standard (all of them received awards from the Polish Academy of Sciences in Cracow).

The outbreak of the war in 1914, interrupted Professor Sierpiński's didactic work. He was interned by the Tsarist authorities, first in Vyatka, and later in Moscow. There, the excellent Russian mathematicians Egorov and Luzin extended a most cordial reception to him and created very convenient conditions for his scientific work. This period brought important joint works by professors Sierpiński and Luzin which laid the foundations for their long co-operation in the domain of analytic and projective sets as well as the theory of real functions.

In February 1918, Sierpiński returned to Lwów and in the autumn of the same year he became a professor of the reborn Polish University in Warsaw. Here began an extremely important stage of Sierpiński's activity, which was an equally important stage in the history of Polish mathematics. At the time, the whole community awaited the recovery of independence and was preparing and elaborating the cornerstones of Poland's future independent statehod in all its aspects. This also concerned the organization of science, and found its most powerful expression in the field of mathematics, through the plan proposed by Professor Zygmunt Janiszewski of the University of Warsaw (and, incidentally, Professor Sierpiński's assistant during his Lwów period). The plan provided for the creation of Poland's own school of mathematics, centered around set theory, topology, and the foundations of mathematics, in other words those disciplines in which considerable success had been won by Sierpiński, Janiszewski, Mazurkiewicz (who wrote his doctor's thesis in 1913 under Sierpiński's guidance), partly by Łukasiewicz and some young

mathematicians. They resolved to found their own, specialized publication *Fundamenta Mathematicae*, which was in time to become the most important publication in the world as regards the disciplines dealt with. Janiszewski became the editor-in-chief. Unfortunately, he died prematurely, before the first volume appeared in print. Sierpiński together with Mazurkiewicz, carried on the work, assumed the post of editor and kept it for many decades.

The extremely intensive development of the Polish school of mathematics, which by the end of the 1920's also encompassed the Lwów centre, led by Banach (which dealt with different subjects), put Polish mathematics among the world leaders. Sierpiński with his exceptional activity, was its *magna pars* and leading representative. The most renowned universities awarded him honorary doctorates, numerous academies of sciences elected him a foreign member; at all international congresses Professor Sierpiński was invited to sit in the praesidium.

The two decades separating the world wars was the period of the greatest flourishing of Sierpiński's talent, illustrated by the number of published works, the publication of his fundamental work "Hypothèse du continu" (in Monografie Matematyczne, of which he was a co-founder), the education of an enormous number of students, a number so high that almost every younger Polish mathematician is indirectly or directly Sierpiński's student. In the same period Professor Sierpiński was actively engaged in large-scale organizational work; he was the President of the Warsaw Scientific Society, member of the Board of the Polish Academy of Sciences and, for some time, President of the Polish Mathematical Society and the Society of Secondary and University-level Teachers (thereby expressing his interest in secondary schooling).

At the outbreak of the Second World War Professor Sierpiński was in Warsaw. Scientific work kept up his spirit. He wrote some dozen articles, a number of textbooks and new, revised versions of his books. With an optimism that was so much a part of him he deeply believed that all of it would be published in liberated Poland. Nor did he stop teaching; in an underground university he conducted classes with a small group of students as the conspiratorial conditions permitted. The home of Professor Sierpiński, with the help of his invaluable, energetic wife, was the site of frequent meetings of the most trusted colleagues and friends who exchanged news and often came to assist those who were most endangered.

After the Warsaw Uprising the Germans took him to the environs of Cracow. After the liberation of the town he lectured, though for a short time, at the Jagiellonian University, and afterwards, in the autumn of 1945, he returned to his former position in the University of Warsaw. He again engaged in lively didactic scientific and publishing activity. He published *inter alia* a synthetic encyclopaedic monograph on set theory

entitled *Cardinal and Ordinal Numbers* (1958). Six years later (in 1964) he published a no less important monograph *Elementary Theory of Numbers* which testifies to the return of his original interest, that is number theory. In fact, the works from the last twenty years of his life, mostly dealt with number theory. The same thing applies to his teaching: he trained a younger scientific staff in this discipline, which is rather rare in Poland, and found new students. Professor Sierpiński was also editor-in-chief of *Acta Arithmetica,* an international periodical on number theory, whose publication was resumed after the war (the previous editors either did not survive the war or left Poland).

Organizational matters continued to take much of Professor Sierpiński's time. He continued to be the President of the Warsaw Scientific Society and as such he actively worked on the reconstruction of Polish science which had been devastated by the occupation. He participated in the First Congress of Polish Science and later in the Organizing Commission of the Polish Academy of Sciences. After the foundation of the Academy he acted as its Vice-President for two successive terms of office and remained a member of the Academy's Board until shortly before his death.

He worked actively on the organization of a new centre, so very important for the development of mathematics: the Institute of Mathematics, which was one of the first institutes of the Polish Academy of Sciences. He was elected Chairman of the Scientific Council of the Institute, and later, from 1968, its honorary chairman, which function he performed to the end of his days.

His contribution to Polish science was highly estimated by the government of the Polish People's Republic and scientific circles. In 1949, Professor Sierpiński was awarded a scientific prize of the first degree; in 1957, he received the Grand Cross of the Order of Polonia Restituta, and earlier the Order of the Banner of Labour, First Class. Warsaw bestowed upon him (for the second time) its city award, and the Polish Mathematical Society presented him with honorary membership.

Scientific circles abroad also acknowledged his great contribution to science. Following is a list of Professor Sierpiński's honorary doctorates and foreign memberships in academies of sciences:

The title of doctor *honoris causa* was bestowed upon him by the universities in Amsterdam, Bordeaux, Lucknow, Lwów (before the war), Moscow, Paris, Prague, Sofia, Tartu (before the war), and Wrocław.

Professor Sierpiński was elected a foreign member of the academies of sciences of Bulgaria, Czechoslovakia, the Netherlands, Lima, Naples, Germany, Paris, Rumania, Serbia, Italy, Zagreb, and the Papal Academy of Sciences.

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There are few scholars, whose creative work could be compared with that of Sierpiński — enormous work worthy to be called, *aere perennius* — full of new ideas, new valuable results, new problems stimulating an important research.

His influence on his pupils in Poland and also abroad where he travelled many times was often decisive. He inspired them with his ideas, helped them to overcome the difficulties which they encountered, influenced them by his own style of work: he was at the same time teacher and colleague of his pupils. This was due in great measure to the unique atmosphere which he managed to create in his seminars: there he communicated the mathematical news which just reached him as well as his own ideas often in *statu nascendi*, which became subject of discussion of his collaborators and pupils. Title or age did not count in those discussions, only the mathematical competence. The results obtained at the seminar were published sometimes under the name of a pupil who contributed the essential idea sometimes under both names of the teacher and of the pupil; the question of priority almost did not exist.

This unique atmosphere of genuine collaboration among colleagues working with the same end, was one of the most remarkable features of Sierpiński's activity. Nothing made him greater pleasure than the success of his pupils and indeed the success of the pupils was the success of the master.

Such was Sierpiński for his pupils — teacher, colleague, friend.