WŁADYSŁAW ORLICZ (1903–1990). A BIOGRAPHY

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A hundred years have already passed since the day Professor Władysław Orlicz was born. In this time, life has radically changed in almost all its aspects, civilization has made tremendous progress and all fields of arts and sciences, including mathematics, have dramatically developed. A considerable contribution towards extending the limits of our knowledge of mathematical principles, in particular of analysis, understood broadly, was made by a member of the Lvov School of Mathematics, the author of over 170 scholarly publications (including several books), Professor Władysław Orlicz. It is hard to overestimate the significance of the results of his work carried out systematically over the period of 65 years. In many areas he pioneered new research projects setting aims for further studies. Soon, his efforts were noticed by the mathematical community around the world, which greatly appreciated Orlicz's achievements. The developments in mathematics that have taken place within the century has made it a truism to say that Władysław Orlicz was one of the most distinguished Polish mathematicians and a co-author of the monumental achievements of mathematics in Poland.

Childhood and early adolescence. Władysław Roman Orlicz was born in Okocim on Sunday, May 24, 1903. He was the third child of Franciszek and Maria Orlicz who raised five sons: Kazimierz, Tadeusz, Władysław, Zbigniew and Michał. The fourth brother was killed in action during the struggles for Poland's eastern frontiers in 1918–1920 while the oldest died before the end of World War II, his health damaged by incarceration in the Stutthof concentration camp. Of the remaining three all became professors of natural or technical sciences: Tadeusz was a specialist in wood technology while Michał busied himself with climatology and meteorology.

Franciszek Orlicz, an accounting clerk at the famous Okocim brewery, bereaved his family early and unexpectedly—Władysław was then only four years old. The whole burden of raising the bunch of boys befell their mother, Maria née Rossknecht who married again taking the name of Patocka. Maria Orlicz's intelligentsia background and the fact that she was related to the Romer family helped give the Orlicz brothers a good education. Eugeniusz Romer, whose geographical atlases served many a generation of Polish school pupils, was Maria's brother-in-law. The future would show how well their talents were developed. The surviving school certificates of Władysław Orlicz show that he was a very good pupil. He was promoted to successive forms with the note "to the next form commendably fit." Primary and secondary education was completed by Władysław Orlicz in schools of Tarnów, Znaim in Moravia and Lwów (Lviv in Ukrainian), and crowned by the examination for the secondary education certificate taken at the Second State Real School in Lwów on June 10, 1920. The certificate was something to be proud of because it bore the following words: "... as the result of final examinations he was found to be mature and particularly able to study at the Polytechnic." Before taking up studies, Władysław Orlicz saw a few months of active military service. In the summer of 1920, the fate of the newly reborn Polish state was in the balance. Emerging from the Partitions, independent Poland was locked in a mortal combat with Soviet Russia. A wave of general patriotic feelings carried Władysław Orlicz as well making him volunteer for the Polish Army. He did not see any action, however, and soon after the decisive success of the Polish forces in August of that year, he quit the army.

Studies and the beginnings of scholarly career. The studies at Lwów Polytechnic did not give Władysław Orlicz enough satisfaction. Although he got full marks in his first exams, he decided to change both area of study and school after a year. What made him take such a decision was a failure to master descriptive geometry. Nature, while bestowing many gifts on Władysław Orlicz, turned out to be an unusual miser when it came to spatial imagination. So he enrolled at the Philosophical Faculty (from which the Faculty of Mathematics and Natural Sciences was soon to be formed) of the Jan Kazimierz University in Lwów, and started on his great adventure with mathematics. Remembering his early youth, Orlicz used to say that at a certain moment in his life the interest in mathematics outweighed that of literature and, to be sure, in the best and not easy literature. The outstanding works by Wilde, Proust and Przybyszewski that he read lost out to the charms of the queen of science. Władysław Orlicz's early interest in the humanities was absolutely understandable. The Lwów of the 1920s and 1930s was a leading cultural and academic centre of Poland. The city, always staunchly patriotic, was home to many outstanding scholars and artists, and other brilliant all-rounders. Such remarkable figures as, for instance, Leon Chwistek (philosopher, logician, mathematician, art historian and painter) were many. Every day one could meet exceptional and fascinating personalities. There were people to learn from and to follow. Also, the mathematics community could boast a host of celebrities in the persons of Stefan Banach, Hugo Steinhaus, Antoni Łomnicki, Stanisław Ruziewicz and Eustachy Żyliński. This elder generation was soon to be joined by younger scholars: Herman Auerbach, Wilhelm Z. Birnbaum, Marek Kac, Stefan Kaczmarz, Stanisław Mazur, Juliusz P. Schauder and Stanisław Ulam.

Władysław Orlicz began professional work already during his studies. Since 1923 he had served as a demonstrator in the Chair of Mathematics of the Faculty of Philosophy at the Jan Kazimierz University. On 1 August 1925, he was appointed a teaching fellow at the First Chair of Mathematics. The completion of studies in the 1925/26 academic year coincided with his first publication devoted to the theory of summability. The paper appeared in the *Tôhoku Mathematical Journal* in 1926. Władysław Orlicz continued his studies by attending lectures on mathematics given at the General Faculty of Lwów Polytechnic, where he listened to Kazimierz Kuratowski.

In 1928 two important events in the life of Władysław Orlicz took place. On July 12 he married Miss Zofia Krzysik, a teaching fellow at the Chair of Physics of the Jan Kazimierz University and a teacher at the private Grammar School for Girls run by the Notre Dame Sisters. During World War II, Madame Zofia was a much-devoted soldier of the Polish Home Army decorated with the Virtuti Military Order for saving Jewish children from the Holocaust. Her efforts for the cause of Poland's independence did not cease when the war ended. As a result, having been accused of publishing and distributing illicit papers, she spent long five years in prison (March 1948 – May 1953). Most of this time she did in the Fordon prison near Bydgoszcz, where discipline was particularly rigorous and harsh.

The honeymoon of the Orliczs was unusually short as on July 30, 1928 Władysław Orlicz defended his doctoral dissertation entitled *On the Theory of Orthogonal Series*. The supervisor of the dissertation was Eustachy Żyliński.

The 1930s—the beginnings of fame. In 1928, the Ministry of Religious Denominations and Public Education gave Władysław Orlicz a scholarship. It allowed him to travel to Göttingen, an excellent German academic centre. Professor Orlicz spent there, not counting short breaks, two successive years (1929 and 1930). The stay in Göttingen proved to be very fruitful and had a significant impact on the course of his future career. What's most important, he could continue his education, and that under the guidance of outstanding scholars, such as E. Landau, R. Courant, H. Bohr and M. Born. Participating in classes conducted by physicists was also a consequence of the fact that, formally speaking, the scholarship he was given bound him to study ... theoretical physics. Of great value and permanence turned out to be his contacts, established in Göttingen, with Gottfried Köthe, the future outstanding specialist in functional analysis. It was also there, initially in collaboration with his colleague from Lwów, Wilhelm Z. Birnbaum, that Władysław Orlicz joined strenuous efforts to study the questions related to the generalizations of L^p spaces. Further work in this area, done already on his own, soon brought results in the form of function spaces, known today as *Orlicz spaces*.

Beginning with the 1930/31 academic year, Władysław Orlicz was appointed assistant reader at the Second Chair of Mathematics at the Faculty of Mechanics of Lwów Polytechnic. The Chair was then occupied by Professor Antoni Łomnicki interested in applications of mathematics. He authored papers on mathematical cartography and probability.

In December 1931, Władysław Orlicz successfully completed a long and wearisome procedure of obtaining certification as a teacher. He was given "a certificate of teacher of mathematics as a main subject and physics as an additional subject in secondary schools with Polish as the language of instruction," having earlier served periods of practical

teacher training at the private Grammar School for Girls and the Corps of Cadets in 1927–29 and 1930–31, respectively.

Władysław Orlicz's career developed rapidly. On June 22, 1934, the degree of *doctor habilitated* was conferred on him upon presenting the dissertation entitled *On the Study of Orthogonal Systems* to the Council of the Faculty of Mathematics and Natural Sciences of the Jan Kazimierz University. Orlicz's work in this field was of a fundamental nature, which was stressed, for instance, in the book *Orthogonal Series* by B.S. Kashin and A. A. Saakyan published 50 years later.

The results of Władysław Orlicz's research were greatly appreciated in both the University and Polytechnic, which found expression in promoting him to the position of reader at the Polytechnic on 1 October 1935 and granting him the right to lecture at the Jan Kazimierz University. After two more years, on September 14, 1937, he was appointed associate professor at the Faculty of Mathematics and Natural Sciences of Poznań University by President Ignacy Mościcki. Leaving Lwów must have been difficult since a lot was lost, above all, daily contacts with a group of eminent mathematicians, the strongest in the world at that time, working on functional analysis. This group later came to be known as the Lwów School of Mathematics. Its members held regular meetings at the Szkocka Café (today in its premises there is a bank). It was there that the famous "Scottish Book" (literally, the Szkocka Café book) came into being—a thick notepad in which problems that could not be solved at a given moment were written down. The author or co-author of 14 such problems was Professor Orlicz.

The years of World War II. The dark years of Nazi occupation, preceded by Soviet occupation, were spent by Władysław Orlicz in Lwów. Initially, he was able to busy himself with mathematics because under the Ribbentrop-Molotov Pact the eastern territories of Poland had been annexed by the Soviet Union in the autumn of 1939. The Soviet authorities allowed Lwów institutions of higher learning to continue their work. Thus, in November 1939, he filled the position of reader, vacant after Stefan Kaczmarz who was killed in action, at Lwów Polytechnic. In addition, from December 31, 1939 to June 22, 1941, he lectured at Lwów University as a professor at the Chair of Mathematics there. Fate treated Władysław Orlicz kindly by sparing him deportation to the distant East—a sorry lot that befell thousands of Poles at the hands of the Russians. Luckily, too, he was not in the large group of eminent Polish academics, writers and artists murdered by the Nazis on Wzgórza Wóleckie in early July 1941 after the *Wehrmacht* had taken control of Lwów. Under the Nazi rule, he worked officially as a teacher in a public vocational school, while in total conspiracy he taught in secrecy at secondary and university levels, the effects of which were amazing and absolutely unbelievable. In August 1944, Władysław Orlicz saw his first doctoral student, Andrzej Alexiewicz, being awarded a doctorate for the dissertation entitled *On Sequences of Operators*. Also, he deserved praise for saving a large portion of valuable library collections accumulated at a seminar group meeting in Lwów.

After the Nazis were finally driven out of the city in the summer of 1944, the Ukrainian authorities quickly reopened Lwów's institutions of higher learning and reinstated the pre-war staff who had survived. One of them was Władysław Orlicz who served as acting

head of the Chair of Function Theory at the State Ivan Franko University in Lwów from
September 1944 until early February 1945. The political situation towards the end of
the war, however, reinforced his conviction that Lwów would find itself outside of the
borders of re-emerging Poland. Hence, he made up his mind to leave the city and arrived
in Poznań on May 5, 1945, where he spent the latter half of his life.

The Poznań period. The wartime hostilities left Poznań University ravaged. Losses in
every area were huge making problems and difficulties facing the University seem insur-
mountable. Damaged halls of *Collegium Chemicum* lashed by rain, looted or damaged
libraries and few faculty members were all that mathematics could count on at the Univer-
sity when the war ended. Optimism was raised only by a large number of students eager
to study. Heavy teaching loads were a great strain on the modest faculty surrounding
Professor Orlicz. It was their duty to teach classes both at the Faculty of Mathemat-
ics, Physics and Chemistry and to students in other natural science departments. In the
autumn of 1945, Władysław Orlicz was offered a position at the "Silesian Main School"
in Wrocław, where a group of his colleagues and teachers from Lwów found themselves
when the hostilities ended. Luckily for Poznań, efforts by Hugo Steinhaus and others to
persuade Władysław Orlicz to move to Wrocław failed and the Professor remained in
the city on the Warta River. A heavy teaching load and organizational responsibilities
did not slow down his research work. He worked on his own or collaborating mainly
with Stanisław Mazur, number 2 (after Banach) of the Lwów School of Mathematics,
and Andrzej Alexiewicz. Academic achievements secured Władysław Orlicz the title of
full professor on July 21, 1948. At that time he took up additional employment in the
State Institute of Mathematics in Warsaw, which soon was incorporated into the Polish
Academy of Sciences (PAN) as the Institute of Mathematics. Professor Orlicz's ties with
the Institute continued uninterrupted until his death. For many years he headed its De-
partment of Functional Analysis and served on the Institute's Academic Council also as
its vice chairman. Władysław Orlicz received the greatest honours that can be had in the
Academy: in 1956 he became its corresponding member and five years later an ordinary
member of the Polish Academy of Sciences. His knowledge and energy, he continued,
however, to devote to the Adam Mickiewicz University in Poznań, where he headed the
First Chair of Mathematics in the Faculty of Mathematics, Physics and Chemistry until
the spring of 1970.

Professor Orlicz continued his multifaceted work after retiring in the 1970s. He con-
tinued research work, published its results, taught by supervising doctoral students and
giving regular lectures in the widely known seminar called "Seminar on Selected Prob-
lems of Functional Analysis". The seminars were held at the Poznań Branch of the PAN
Institute of Mathematics (it was founded, of course, through his efforts) on Wednesdays,
between 12:30 and 2:00 PM for many years and always very popular. The participants
included mathematicians from western and northwestern Poland. High attendance was
guaranteed not only by the person of the moderator but above all by a varied selection
of topics and frequent visits by outstanding specialists from home and abroad. Continual
encouragement to present their research results was offered to young mathematicians just
at the outset of their career. A painstaking care to maintain the widest possible range

of mathematical problems discussed at these meetings was a manifestation of the exceptionally broad interests of Władysław Orlicz going far beyond his favourite functional analysis and an expression of his dislike of narrow specialization.

At least two generations of mathematicians, having their roots in Poznań, were formed by Professor Orlicz, sometimes called the founder of the Poznań School of Mathematics. It was his talent, extensive knowledge, a warm and permanent interest in the development of the careers of young mathematics devotees and frequent and comprehensive assistance in their research work that contributed to continuous and ever faster development of the Poznań Centre of Mathematics.

Władysław Orlicz supervised 39 doctorates in 40 years. Among those who earned them are many well-known professors and a member of the Polish Academy of Sciences. In addition, the number of MSc theses written under his direction is impressive. There are about 500 of them and on many different subjects including applications of mathematics, to which the Professor always attached great importance. This must have been a result of the pre-war collaboration with Prof. Łomnicki. In those times he appreciated the significance and meaning of applications of mathematics, which made him support projects in applications on many occasions when sitting on the Committee of Mathematical Sciences at the Polish Academy of Sciences.

Remembering Professor Orlicz's activities in various areas, one cannot pass over the fact that he deserved a great credit for promoting journals of mathematics. After World War II, he was among those who worked to revive *Studia Mathematica* and had been editor of this distinguished journal since 1961. For 35 years (1955–1990), he served as an editor of *Commentationes Mathematicae* (Annals of the Polish Mathematical Society).

Professor Orlicz was actively engaged in the proceedings of learned societies, in the first place, the Polish Mathematical Society of which he was president in 1977–1979 and a long-standing honorary member. For 18 years, he was president of the Society's Poznań Branch. For a long time he chaired the Third Department of the Poznań Society for the Advancement of the Arts and Sciences, an organization greatly respected for its work for Wielkopolska province during over more than 150 years of its existence. Also this society numbered Władysław Orlicz among its honorary members. Until his death, he was member of the Warsaw Scientific Society. He joined the Polish Philosophical Society, too.

It is easy to answer the question what position mathematics occupied in Władysław Orlicz's life. It took precedence over everything else, or almost everything since he had always been interested in philosophy and natural sciences and eagerly read publications presenting their new achievements. Mathematics, no doubt, was his destiny. He felt and understood it profoundly, to an extent that is accessible only to few. Mathematics was also with him at the time of his death, which came in Poznań, in the evening of August 9, 1990, surprising him while proofreading a paper accepted by *Mathematica Japonica*.

Distinctions and awards. Władysław Orlicz took part in many events that were important for the international mathematics community. He participated in the International Congresses of Mathematicians in Oslo, Edinburgh, Stockholm and Warsaw, where he was honorary president of the Congress, and travelled extensively delivering talks at

conferences abroad and visiting foreign universities (mainly German). His fame extended far beyond the Old Continent. In the autumn of 1958 he visited China (Beijing, Shanghai, Canton). He also visited Jerusalem and Canada. York University in Toronto bestowed on him the honourable title of doctor honoris causa in 1974. The same did two Poznań higher schools: the Polytechnic in 1978 and the University in 1983.

Władysław Orlicz's accomplishments as far research, teaching and organizational work are concerned were frequently appreciated with various awards and distinctions, among which many were foreign (he was a laureate of the Alfred Jurzykowski Foundation in 1973). High state honours were bestowed on him as well (Commander's Cross of Polonia Restituta Order, Gold Cross of Merit). Twice he was given the Individual State Award (of the second degree in 1952 and of the first degree in 1966), as well as a great number of medals awarded by municipal and regional authorities, organizations, institutions and scientific societies. Władysław Orlicz particularly valued distinctions awarded to mathematicians. Among such awards given to him were the Stefan Banach Award of the Polish Mathematical Society (1948) and the Wacław Sierpiński Medal (1979). He was also given the Copernicus Medal awarded by the Polish Academy of Sciences in 1973.

References

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