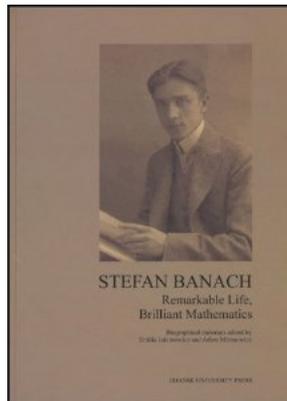**Stefan Banach: remarkable life, brilliant mathematics / Biographical materials edited by** *Emilia Jakimowicz* and *Adam Miranowicz*, (third edition) Gdańsk: University Press, 2011 (xiv+184 p.), hard cover, ISBN 978-83-7326-451-5, US$23.00.

Several papers and books exist on Stefan Banach's life and work. To name just one example: *Through a reporter's eyes: The life of Stefan Banach* by Roman Kaluza (translated and edited by Ann Kostant and Wojbor Woyczynski. Boston: Birkhaüser, 1996). The present book was originally published in 2010 and it now sees its 3rd edition which is also distributed by the AMS. It is an addition to what exits already, but it is not really a full-hearted biography. Like the subtitle rightfully says, it is a collection of biographical material.

Let me quickly go through the different chapters. The first chapter *A remarkable life* by E. Jakimowicz is an account of Banach's life. For a better understanding of the subsequent chapters, it might be a good idea to give a summary.

Banach's origin is already a complicated matter. His father Stefan Greczek was a military, but not married to his mother Katarzyna Banach. Because of lawful regulations and a shortage of income, they could not marry so that the child Stefan Banach (born on 30 March 1892) was entrusted by its mother in the care of Franciska Płowa and her niece Maria Puchalska

who owned a laundry business in Krakow. Before his mother left Krakow, his father promised her to look after his son's well being and that he would not reveal the name of his mother. A promise he kept. That is why Stefan Banach never knew his mother but had a friendly relationship with his father. His father married and remarried later so that Banach had several half brothers and sisters. Banach was raised in a family with reasonable income and reputation, but not of an academic kind. However Juliusz Mien, a Frenchman living in Poland was a good friend of the family. He was a photographer (hence the many pictures of Banach as a child) but he also translated poetry. He was the one who learned Banach to speak French fluently. Banach went to grammar school, and unlike some geniuses, he was a good student until in 1910, just before his final exams he lost interest and just passed only because he was backed up by the school priest. From 1911-13 he studied at the Lvov Polytechnic and got a diploma. In those days Lvov was a cultural and scientific center in Poland. Without formal lessons, Banach studied mathematics on his own, sharpening his knowledge by intensive discussions with his math-loving friends. When WWI broke out, Banach was exempt from military service because he was left-handed and had poor vision in his left eye. He was "discovered" by Hugo Steinhaus who overheard two young man sitting on a bench in the park discussing the Lebesgue integral. These youngsters turned out to be Banach and Otto Nikodym. Steinhaus invited them to his house and posed some problems he had been thinking of. Banach came back the next day with the solution, and this has lead to his first mathematical publication in 1919. A year later, Banach married Łucja Braus. From that time on things went smoothly for him. Banach as appointed assistant at the Lvov Polytechnic. The story of his PhD goes as follows. Banach, being very productive and publishing important mathematical results was urged to pass his PhD exam. However, he constantly postponed it with the argument that he had yet to find a much more important result. So he was trapped and asked to come to the dean's office where some people wanted to ask some questions about his work. Banach went and answered the questions without being aware that this was his PhD commission taking the exam.
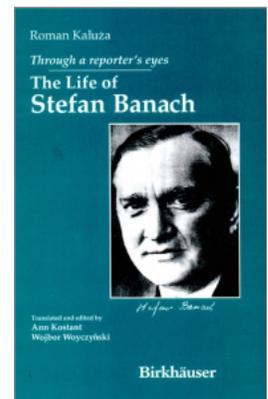
In 1922 he was appointed professor at the Jan Kazimierz University (now Lviv University in Ukraine). His mathematical fame was constantly rising. He also started writing textbooks mainly for the money. He was regularly in need because of the poor health of his wife needed expensive treatment and he was also an extensive visitor of coffee shops. The Scottish Café in Lvov became a legendary place. It hosted everyday sessions of the local mathematical community, not visited by student. Stanislaw Ulam, was one of the few exceptions, since he was invited as a brilliant student. The café had marble table tops on which one could write,... and which could be wiped. Many proofs got lost that way. Some that nobody could reconstruct afterwards. So it was an excellent idea of Banach's wife to buy a hard cover notebook that could be asked by any of the visitors. It contained problems posed and the prize awarded for a solution

(e.g. a bottle of wine or 100 gram of caviar). The book became a mathematical relic and is now available in facsimile. It can be found on the web together with a translation[1].

Stefan Banach

Around WWII, Lvov became Soviet-German battleground. When the city was captured in 1939 by the Soviets, many intellectuals were deported. Banach was saved, maybe because of his strongly communist inclined friend Stanislaw Mazur. From 1941 till 1944 the Germans invaded Lvov and executed 22 professors. The chemist Rudolf Weigl from the bio-faculty experimented with lice to produce a typhus vaccine. The Germans wanted him to increase the production and many mathematicians and other intellectuals were saved because by feeding the lice with human blood, they became necessary for the production. Banach and his son Stefan Jr. were among them. When in 1944 the Soviets regained the city, the population was deported during an ethnic cleansing. Banach's wife and son were sent to Wrocław. Shortly after the war, Banach died on 31 August 1945 from lung cancer.

The second chapter contains several *Letters* (originals reproduced with English translations) between Banach and Ulam. Quite emotional is a letter written by Banach's father of 30 October 1943 in which he reveals the truth of what had really happened and why he was raised in a foster family.

Chapter three contains *Recollections* mostly by several people from the family. One is from his son, Stefan Jr. (1922-1999) who was a neurosurgeon, others are from grandchildren in the family, colleagues and friends.

S. Domoradzki, Z. Pawlikowska-Brozek and M. Zarichny give in chapter 4 a list of items related to Banach that they have collected from the archives of the university. It is basically an enumeration of the items with a couple of lines describing the contents of each one.

A brief and really smooth introduction to the main mathematical achievements of Banach even accessible for a non-mathematician are described by J. Musielak in chapter 5: *Banach's opus scientificus*.

Chapter 6 on *Stefan Banach and Lvov mathematical school* by K. Ciesielski and Z. Pogoda is an English translation of a paper published previously. It repeats some material of the first chapter and adds a bit of mathematics.

Similarly, chapter 7 about *The Scottish book* is a translation of a paper by M. Kordos, that describes 6 problems from the book. Three of them have been solved, the other three are still open.

Banach monument Krakow

R. Duda describes in the next chapter the lifespan of *The new Scottish book*. Banach's wife had brought the original Scottish book to Wrocław and E. Marczewski took the initiative of starting a new book in the tradition of the original one. Steinhaus entered the first problem in 1946, being the one entering the last problem in the previous book 5 years earlier. It continued for over 40 years till the last two problems were entered in 1987.

Besides these chapters, the book has ample illustrations, photographs and reproductions of original letters and documents.

Even though this is the third edition, there are some flaws in the typesetting and production of the book. For example, the ISBN number on the back cover and on the bibliographic page in front differ and differ both from the number on the AMS webpage. At several instances, I could find some typos, for example, on page 156: $25 + 1 = 33$ where it should be $2^5 + 1$. Sometimes LaTeX typesetting commands pop up (because they are missing a backslash). Also Lvov is written in different ways: Lvov (Russian), Lviv (English), Lwów (Polish),...[2] Most disturbing however is that near the end of the book the order of the pages is mixed up. One successively finds pages 1-160, followed by 181-184, then 165-179 and 161-164, and finally 185. Since this affects the references, the bibliographic notes, the name index etc., all things to which is often referred in the text, this is highly annoying.   Adhemar Bultheel

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[1] `kielich.amu.edu.pl/banach/e-scottish-book.html`
[2] The German name is Lemberg.