

Jarosław Abramow-Newerly

PROFESSOR WACŁAW SZYBALSKI ON LWÓW, GENES, THE ESSENCE OF LIFE, AND NOBEL LAUREATES

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In memory of my wife, Wanda – the good soul of this book

Jarosław Abramow-Newerly

On the one hand, the most important thing in life is to create something, on the other, to have friends, to work, not to turn away from life. You have to be brave. Finally, you must achieve and do something. Do something good for Poland and for Lwów.

Wacław Szybalski

## Jarosław Abramow-Newerly

# PROFESSOR WACŁAW SZYBALSKI ON LWÓW, GENES, THE ESSENCE OF LIFE, AND NOBEL LAUREATES

Scientific cooperation, footnotes, supplementing memories, selection and description of photographs

Irena Fraczek

Translated by David Malcolm



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#### **PREFACE**

Professor Wacław Szybalski, a prominent Polish-born scientist living and working in the United States, and a pioneer of modern molecular biology, is known to many generations of scientists all over the world. I met the Professor many years ago and his numerous works fascinated me throughout my scientific career both at home and abroad. Wacław and I would meet at scientific conferences in Poland and across the world. I valued the conversations we had together. We spoke about everything: science, art, and his beloved Lwów. In this way, I learned many details about his extraordinary life, his scientific ideas, and his passion for their realization.

Professor Wacław Szybalski is an incredibly colorful figure, and his life has been full of successes, tragedies, and extraordinary events. He was born in Lwów in 1921, right after Poland regained independence. He loves the city of his youth, the Polish Lwów, with all his heart, and it is a love that endures to this day. He was a perfect student and a passionate sailor; he flew on gliders, and parachuted out of airplanes, and traveled the world. He spent the interwar period in Lwów and endured the years of two ruthless occupations, first by the Soviets and then by the Nazis.

After the Second World War, he became involved scientifically with the Gdańsk University of Technology, where he proved that he was not only a great young scientist, but also a great planner. He founded the scientific Department of Biotechnology and looked after his students with great care. Unable to come to terms with the Stalinist regime of lies and terror under which Poland found itself after the war, he left the country permanently in 1949. He emigrated to the United States through Denmark and quickly re-started his career in science. He started working at the pharmaceutical company, Wyeth, and then he conducted research at the famous Cold Spring

Harbor Laboratory and the Waksman Institute at Rutgers University, before settling permanently at the University of Wisconsin–Madison.

Professor Szybalski became very famous for his discoveries in the emerging field of molecular biology. These were revolutionary, worthy of a Nobel Prize. The complicated and incredibly novel methods of manipulating genetic material that he developed contributed greatly to the development of biology and molecular genetics. The discovery of these methods led the Professor to formulate the principles of gene therapy, and subsequent work enabled the production of specific monoclonal antibodies that are of incredible importance to the diagnosis and treatment of many diseases.

Thanks to his unique research on the bacterial virus called Lambda phage, he was hailed as the father of "lambdology," because he was the first to propose using this virus in breakthrough discoveries that led him to the development of synthetic biology and gene cloning. He also founded the scientific journal *Gene* and was its editor-in-chief for over two decades. This journal became one of the most important periodicals devoted to contemporary molecular genetics and genomics.

Professor Szybalski's knowledge and fame allowed him to participate as an expert in the famous project of mapping the entire human genome. He was also invited as an expert by Pope John Paul II to provide counsel on matters of ethics in modern biology.

He became famous for being the author of many theories of the modern treatment of diseases. He was the first to formulate and prove the great benefits of multi-drug therapy, which later was used in the treatment of a variety of diseases, including tuberculosis, leukemia, and AIDS.

For his extraordinary achievements, Professor Szybalski has received five honorary doctorates and many medals of distinction, including the Order of *Polonia Restituta*, First Class, the highest honor awarded in Poland.

Wacław always emphasized his Lwów Polishness on the international scene, and he has always maintained strong ties with Poland. Many young Polish scientists came through his laboratories. He funded a number of scientific projects in Gdańsk, and in the United States, he helped fund a spacious Annex to the famous historical Carnegie Library at Cold Spring Harbor Laboratory.

Knowing Wacław's fame and his extraordinary life, I became convinced that they should be described in more detail. For a long time, I tried to convince him

to do so, but he kept refusing. It was not until several years later that I was able to persuade him, using as an argument that his career and incredible achievements could serve as a perfect model for new generations of young scientists, that it is worthwhile to devote one's life to science and to remain an intellectual and patriot at the same time. I also persuaded him that his biography would help to preserve and share the memory of a Polish Lwów, something which he always cared about greatly.

I mentioned the need of writing a book about Professor Wacław Szybalski and his life to my friend and outstanding Polish author, Jarosław Abramow-Newerly, and I began persuading him to write it. He too refused at first, afraid of the complex scientific topics, but he finally gave in after much encouragement. And so, a famous Polish scientist and a famous Polish writer became acquainted with one another.



Professor Szybalski skiing in 2013 (photograph by I. Frączek)

Finally, it should be added that the book was also written with the significant contribution of the author's wife, Dr. Wanda Abramow-Newerly. As a molecular biologist, she introduced the author to the secrets of Professor Szybalski's complicated work. She worked with the author, correcting the text so that it would be understandable for all readers. As fate would have it, despite having devoted her scientific career to fighting cancer cells, she herself had to struggle with cancer, a battle which she unfortunately lost. She died in April 2016, before this book, of which she was the guardian angel, was published. It was also thanks to her that the author was able to persevere in the lengthy and difficult work on this book.

The result is a fascinating, *belles-lettres* biography of Wacław, and at the same time, a story about his family, about Lwów, and Poland after the war, about emigration and important scientific discoveries, and about the many famous people he met throughout his interesting life.

I am very happy that I was able to initiate the creation of this book, and I hope that Professor Wacław Szybalski's example will show us how one can live with a passion for science, be fascinated by it, make great discoveries, and continue to cross-country ski throughout one's entire life, even at the very mature age of over ninety years old.

Jerzy Barankiewicz Cincinnati, March 2012 San Diego, April 2018

The author was greatly aided by the scientific cooperation of Irena Frączek, who clarified many matters in an interview with Wacław and edited the text carefully. She also authored the detailed footnotes and described the extremely interesting photos and documents from his private archive. The diaries of Stanisław Szybalski, Wacław's brother, were also used in the writing of this book. The author and the family of Professor Szybalski would also like to thank Professor Ewa Łojkowska for successfully seeing this book through to publication.

The book is complemented by a film about Wacław Szybalski, titled *The Essence of Life*, directed by Anna Ferens and produced by Faster Film Production. The film was made in 2014 and had its Polish premiere during a special exhibition organized by the Professor Wacław Szybalski Foundation, at the Gdańsk Shakespeare Theatre, on March 11, 2015. Thanks to the kindness of the producer of the film, Małgorzata Matuszewska, and the director, Anna Ferens, we can also make it available to the readers of this biography, for which we are very grateful, and we would like to thank them both.

Professor Wacław Szybalski Foundation Gdańsk University Press

#### INTRODUCTION

Of the famous scientists from all over the world who are currently living in Madison (Wisconsin, USA), Professor Wacław Szybalski has possibly the most interesting life story. In his beloved Lwów, he experienced a true, colorful Polish childhood and early adulthood, and he survived two occupations, twenty-two months by the Soviets and almost three years by the Nazis. He graduated with a degree in engineering and was active in the Polish Resistance, and after the war, he helped in the reconstruction of the Gdańsk University of Technology, which had been destroyed during the war. The maxim "always upward" that he had written in his school diary became his driving force, propelling him to leave Poland under the Stalinist regime and to carry out scientific work at the best laboratories in Denmark. From there, his path led straight to the United States where he quickly made many discoveries that furthered the development of biology and molecular genetics.

He was sometimes jokingly called the "Professor of Lambdology" (due to his research on the development and transcription of the Lambda phage), and his research was often ahead of its time. His greatest achievements include: formulating the concept of multi-drug therapy, that later greatly improved the effectiveness of the treatment of diseases such as tuberculosis, leukemia, and AIDS; creating and contributing to the development of gene therapy, that enabled the repair of genetic material; and establishing the basis of synthetic biology, which permitted the creation of molecules of life and new organisms. For this reason, Professor Szybalski is often referred to as the father of synthetic biology, a term for this field of science that he coined in 1974.

Over the course of his long and successful career, he has had the opportunity to work with some of the best minds of our age, from prominent scientists of the Lwów school (*Vivat Professores Leopoliensis*!), for example,



Knight of the Order of Polonia Restituta First Class at the Royal Castle in Warsaw, May 3, 2011

Stefan Banach, the greatest mathematician of the twentieth century, to many world-class scientists from Europe and America. He has encountered many Nobel Prize-winners along the way. This lengthy list includes Maria Skłodowska-Curie, whom he met personally in 1934, and Niels Bohr with whom he worked on the problems of nuclear physics in 1947–1949. In the United States, he became friends with James Watson and Francis Crick, the discoverers of the double helix model of DNA, considered by many as the most important discovery of the twentieth century.

During his countless trips around the world, he met many important people from the worlds of culture and politics. He met five Polish presidents (Ignacy Mościcki, Aleksander Kwaśniewski, Lech Wałęsa, Lech Kaczyński and Bronisław Komorowski), the future Queen of Denmark, Margaret II, and the former English King, Edward VIII. He became friends with the famous actress

Audrey Hepburn, and in Africa, he danced with Meryl Streep. Pope John Paul II invited him for a private audience to discuss the topic of genetic engineering. He met with Indira Gandhi and her son, Rajiv Gandhi. He also gave a speech on the subject of genetic engineering to the German Bundestag.

Professor Szybalski authored over five hundred scientific papers and founded the international journal *Gene*. He is a member of the Polish Academy of Learning and a foreign member of the Polish Academy of Sciences. He was awarded an honorary Mendel Medal from the Czech Academy of Sciences. He has received a number of international awards, and honorary doctorates from five Polish universities (the Maria Curie-Skłodowska University, the University of Gdańsk, the Medical University of Gdańsk, the Gdańsk University of Technology, and the Jagiellonian University), and he received the Grand Cross of the Order of *Polonia Restituta*, First Class, the highest honor awarded in Poland.



Visit to the Polish Embassy in Washington when Professor Szybalski was selected to become a foreign member of the Polish Academy of Sciences in 1994

# CHAPTER 1

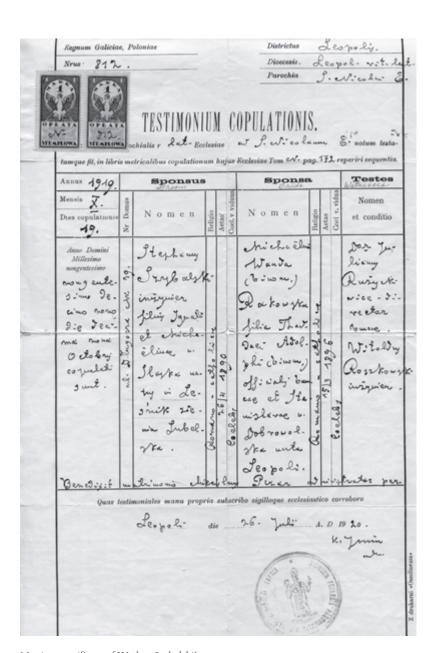
## THE EARLY YEARS IN LWÓW

#### THE WELCOMING HOME OF THE SZYBALSKI FAMILY

When I arrived in Madison for the meeting that was to start this story, Professor Szybalski greeted me warmly in beautiful Polish, the type of which can no longer be heard in the modern media. The very melody of it helped me transport myself to the most joyful, most animated city of pre-war Poland, the citizens of which were famed for their unique sense of humor and honest friendships, to Lwów, as it once was. It was a city of many nations and faiths, and a very Polish one indeed, a center of university and political life, thick with theaters, revues, and cabarets, magnificent museums and art galleries, impressive buildings and monuments, and the fruit of the work of the most prominent of Lwów's architects – the pavilions of the Universal National Exhibition and the Eastern Trade Fair which were held every fall between 1921 and 1939. Such a Lwów exists now only in the colorfully published albums of monuments, one of which now lies open in front of me. The Professor took it out to show me a photograph of his childhood home located at ul. Świetego Marka 2 (2 Saint Mark's Street), where he was born and where he spent the first twenty-three years of his life. His eyes sparkled with clear affection as he looked at these photographs.

Wacław Tadeusz Szybalski was born on September 9, 1921, just after World War I, into the well-known Lwów family of the Szybalskis. Many family treasures from that time adorn the Professor's house in Madison. Looking at them

<sup>&</sup>lt;sup>1</sup> Many details from the life of the Szybalski family are also documented in the memoirs of Stanisław Szybalski, Wacław's brother, younger by six years.



Marriage certificate of Wacław Szybalski's parents

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Wacław Szybalski's birth certificate (Lwów, September 9, 1921) and christening certificate (September 29, 1922 in St. Nicholas Church in Lwów). The godparents were Tadeusz Rakowski (brother of Michalina, Wacław's mother) and Zofia Bogdańska *née* Teodorowicz, a relative by marriage of the Szybalski family and a relative of the last Lwówian archbishop of the Armenian Catholic Church, Józef Teodorowicz



Wacław Szybalski with his parents on the day of his christening on September 29, 1922



Stefan Szybalski during his years at the gimnazjum, 1906–1907

as unique fragments of a reality that is long "gone with the wind," I listened to family stories and anecdotes about the people most dear to him, among whom he grew up.

Wacław's father, Stefan Szybalski, born in April of 1890, graduated from the renowned Wawelberg and Rotwand<sup>2</sup> Polish technical school in Warsaw, under the extremely oppressive Russian partition of Poland. As a certified mechanic-technician, he went to France to continue his education and graduated from the University of Toulouse in 1913, with a degree in electrical engineering.

After returning to Poland, he worked on the Warsaw City Council. Afterwards, he became the director of Arma, a Lwówbased factory producing hunting and military weapons. This position was suggested to him by a close friend, Count Dr. Stanisław Mycielski,<sup>3</sup> with whom Stefan Szybalski frequently met at the Lwów intelligentsia club known as the Casino of the Literary and Artistic Association, located on Akademicka Street.

Stefan Szybalski was a great director, and he sold many weapons to various

<sup>&</sup>lt;sup>2</sup> A mechanical and technical school founded in 1895 in Warsaw by the Polish financiers and philanthropists, Hipolit Wawelberg and Stanisław Rotwand. It received the status of a polytechnic university in 1906, and was incorporated into the Warsaw University of Technology in 1951.

<sup>&</sup>lt;sup>3</sup> Stanisław Mycielski (1864–1933) – doctor of law, a deputy of the Diet of Galicia and Lodomeria (1901–1913), and a notable Polish economic activist. As a member of the Economic Society of Galicia, he sat on the supervisory boards of numerous banks and enterprises. He was also the president of the Friends of Fine Arts Society (1914–1920) and was in charge of the Lwów Center for the Blind.

I first met Wacław Szybalski in the early 1950s when he arrived at Cold Spring Harbor Laboratory (CSHL), from postwar Soviet-dominated Poland. [...] This was the beginning of a now almost over 60-year friendship. Our common thread of interest was the Phage Group, started by the biophysicist Max Delbrück. We also had both studied in Copenhagen. [...] Szybalski's seminal scientific accomplishments are broad-ranging Wacław's education in Poland was initially based in engineering and chemistry, followed up by studies in genetics. This has given him a unique view on genetics and molecular biology, resulting in a remarkable range of discoveries, many of which have had a very practical application in genetics, medicine, and genomics. [...] He was ahead of his time with his ideas and scientific vision.

Prof. James Watson, Nobel Prize in 1962 for double helix structure of the DNA molecule

Many people have contributed to the publication of this book: its protagonist, Professor Wacław Szybalski, who has amazed us with his splendid memory and his concern for detail, both when describing people — members of his family and his many friends and colleagues in science — as well as places and events; Jarosław Abramow-Newerly and his wife Wanda, who conducted and recorded many interviews with members of the Professor's family and his friends; and Irena Frączek — the colleague and friend of Professor — who supplemented the recollections recorded by the book's author and supplied photographs and notes.

The idea of the book, which dates from 2010, and the proposal that Jarosław Abramow-Newerly write it, came from Dr. Jerzy Barankiewicz, founder and president of the Polish Arts Salon in San Diego. The Professor Wacław Szybalski Foundation undertook to publish the book, which describes the full life and enormous scientific achievements of one of the most outstanding Polish scientists. Professor Szybalski left Poland in 1949, but as a Pole and a citizen of Lwów he has always supported Polish science. For his services to science, he has received honorary doctorates from five Polish higher-educational institutions, and in 2011, the President of the Republic of Poland, Bronisław Komorowski, awarded him the Grand Cross of the Order of Polonia Restituta.

Prof. Ewa Łojkowska, president of the board of the Professor Wacław Szybalski Foundation



