

Professor Alexander Zawadzki of Lvov university – Gregor Mendel’s mentor and inspirer

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It is generally agreed that Johann Gregor Mendel (1822–1884) is the undisputed father of genetics, the study of heredity that is fundamental to our understanding of all living things. However, as a geneticist and engineer, strongly influenced by my teachers in Lvov and Gdansk, in Copenhagen and in Cold Spring Harbor (NY), I have always wondered how it was possible for Mendel to be such an independent thinker while not having a mentor who could have guided his creative and analytical thinking. Was there anybody in Mendel’s life who could have played this role? At the very least, did he get any opportunity to discuss his experimental designs with some colleague or to receive any help from a mentor or a friend in analyzing his results? The purpose in preparing this essay is to bring to light a long neglected story of how an «obscurer Polish Professor from Lvov University», Alexander Zawadzki, played a critical role in helping an «obscurer Austrian monk», Gregor Mendel, to create the discipline of genetics.

Keywords: Gregor Mendel, Alexander Zawadzki, genetics.

I was unaware of any answer to a dilemma if there were anybody’s «shoulders» for Gregor Mendel to stand on as he invented the science of heredity until around 1970, when I visited Mendel’s hometown of Brno, Czechoslovakia as a guest of my postdoctoral collaborator, Dr. Zdenka Hradecna. She introduced me to the Curator of the Mendelianum Musei Moraviae, Prof. Dr. Vitezslav Orel, who gave me a private tour of the Museum. During the course of our conversation, Dr. Orel learned that I was born in Lwow (Leopolis in Latin, Lwow in Polish, presently Lviv in Ukrainian, Lvov in the international sources), and had graduated from one of its Universities. He then told me with excitement that he had news of utmost importance for me as a geneticist. He further related to me that Gregor Mendel and Alexander Zawadzki, professor of Lwow Universi-

ty, were together for 14 years at the Brno Technical College where the 24 years older Zawadzki acted as Mendel’s de facto scientific supervisor and frequent source of his inspirations.

Alexander Zawadzki was born on May 5, 1798, in Bielsko (Bielitz under Austria). After graduating from school, Alexander moved to Olomouc in Moravia. There in the years 1815–1817, he became a student in the Philosophical Institute.

Young Zawadzki was eager to enroll at a major University to study medicine or other science-related subjects, but his family finances were insufficient, and in 1817, he was forced to return to Bielsko where he supported himself as a private tutor.

In 1818 he decided to travel by foot to the city of Lwow that was at that time under the Austrian partition. There he succeeded in becoming an extracurricular student at the University. During that time, he

began to dabble in publishing. In 1829 he received a Ph. D. degree and, subsequently, a teaching position at Lwow Seminary and a reader position in botany at the Department of Surgery, University of Lwow.

His next step must have been the habilitation process followed by an official appointment in 1837, as a professor of mathematics and physics at the Philosophical Institute in Przemysl, an affiliate of Lwow University. In 1840, he resigned from the position at Philosophical Institute in order to assume the prestigious chair of physics at Lwow University. He was later elected as a Dean of the entire Faculty of Philosophy of Lwow University.

Zawadzki's academic career and scientific successes in Lwow were brought to an unfortunate end by the «Spring of Nations» revolution in 1848. During his tenure as a Dean of the faculty, he had been a supporter of the ideas of this revolution and he bravely aligned himself with the demands of the rather progressive body of Leopoldian teachers and students. Austria's suppression of this revolution was followed five years later by a disciplinary procedure that resulted in Zawadzki's dismissal as a Dean and faculty member of Lwow University. As a result of this political persecution in about 1853 or 1854, he had to move to Brno, Moravia. His choice of Brno is understandable since he was very familiar with this area, he was born close to the Czech border, and he had been student at Olomouc, Moravia.

That Zawadzki and Mendel happened to meet and form a scientifically productive relationship, could be ascribed to opportune meeting of two scientists with common interests. But it is also important to note that they shared a common history that may have nourished their professional relationship. In the 14 years that they were together in Brno, Zawadzki acted as an unofficial «superior and scientific mentor» for the 24 year younger Mendel. Professor Orel has stated to me in his e-mail of April 8, 2007: «According to the latest investigations, Mendel in his research was explaining the basic law of heredity and of evolution. Zawadzki was the only man in Brno with whom Mendel could intelligently discuss his research and who surely supported him».

Zawadzki and Mendel were both friends and scientific colleagues at the Faculty of the Brno Technical College (Figure). Mendel greatly appreciated the wisdom, friendship and kindness that he re-

ceived from Zawadzki, who acted as his unofficial mentor. For Mendel, Zawadzki was a natural «authority», since he was older (something of utmost importance at that time), and he was regarded as a political and revolutionary hero, because of his participation in the 1848 revolution. He was also the scientific authority, the highest at Brno at that time, as a former Professor and Dean of the famous Lwow University and an elected Vice-President of the Natural Sciences Society in Brno. Mendel depended very much on the guidance of the Leopoldian mathematician, physicist and botanist who was so helpful to him in the design and interpretation of the quantitative results of his pea plant (*Pisum sativa*) experiments conducted in a small garden at the monastery building in Brno. Over several years, two of them spent long hours together discussing these experiments. In fact, there may have been little else of any scientific interest available in the sleepy town of Brno.

The mathematical approach that Mendel applied to the pea plant experiments was almost the first such approach to the study of heredity. Darwin who published his monumental work «Origin of Species» in 1859, was very much interested in the mechanism of variation in plant and animal populations. Darwin's experiments are overwhelming in scale and scope; they established the point that he wanted to establish beyond all doubt, but they contributed nothing relevant to our understanding of the underlying logic of inheritance. Darwin never met Mendel and even did not know about his work, although unopened and unread reprint of Mendel's 1865 publication was later found in Darwin's possessions. Mendel visited London in 1862, however, for unknown reason, he did not meet Darwin.

There were others in Mendel's career who knew him and were aware of his work but who failed to recognize its significance. When Mendel published his monumental work in 1866, his Abbot, Cyrill Franz Napp of the Monastery of St. Thomas in Brno, showed negative interest in Mendel's discoveries. This is demonstrated in June 15, 1859 letter that Napp wrote to Mendel:

«Dear Brother in Christ,

On Wednesday of this past week, I had tea with His Excellency the Bishop. During the course of our conversation, he inquired about rumors that have come to his ear



Co-workers of the Realschule Faculty of Brno Technical College in 1864: 1 – Prof. A. Zawadzki and 2 – Gregor Mendel

regarding certain experimental investigations by one of the brothers of our monastery. He was referring, of course, to your own inquiries into the procreative habits of peas. I assured him that your efforts were in earnest, and that you had discerned intriguing mathematical patterns among the inherited characteristics of peas. The Bishop suppressed a giggle as I described your pea-genealogies, which he thought more exquisitely contrived than the family tree of the Emperor himself. He asked if I thought it seemly for a man of your intellectual attainments to be plodding in a pea patch, prying into the germinal proclivities of peas. He suggested that pea propagation was a subject less worthy of your curiosity than, say, the writings of the Church Fathers or the Doctrine of Grace. My dear Brother Mendel, as sympathetic as I am to your researches, we can ill afford to have the monastery made the laughingstock of the diocese. I have therefore issued instructions that your prolific pea patch be plowed and replanted with potatoes. (W. S.'s underlining)

Zawadzki, greatly impressed by the Mendel's novel and groundbreaking research, nominated him for a membership in the Natural Sciences Society, and he was highly instrumental in Mendel's presentation of his first monumental paper on the inheritance in pea plants, the actual birth of the science of genetics. In 1865, Mendel reported his experiments on inheritance in *P. sativa* to the Brno Natural Science Society. In

1866, he published his paper entitled «Experiments on Plant Hybrids» in the transactions of the Natural History Society of Brno.

In 1868, in the year of Zawadzki's death, Mendel followed in his mentor's footsteps by being elected to Zawadzki's former position as the Vice-President of the Natural Science Society in Brno.

Zawadzki retired in 1867. Unfortunately, at the beginning of 1868, he fell and broke his hip. The resulting trauma confined him to his bed for his remaining months, and he passed away on May 6, 1868.

Full version of the article you can read at The Polish review [11].

Acknowledgements. I was inspired by Prof. Dr. Vitezslav Orel as to prepare my original long version of this essay, complementary to his articles about Prof. Zawadzki. This article is currently in press in The Polish Review, Polish Institute of Arts and Sciences of America, New York, NY. The idea to publish its short version also in the journal «Biopolymers and Cell» originated with my good friend Professor Rostyslav Stoika, who works at the Institute of Cell Biology in Lvov, the city where Prof. Alexander Zawadzki began his scientific career. Prof. Stoika has prepared this abbreviated version, when I felt overwhelmed by many duties at the time when this article had to be published on schedule.

В. Шибальські

Професор Львівського університету Александр Завадські – наставник і натхненник Грегора Менделя

Резюме

Загальноновизнано, що Йоганн Грегор Мендель є фундатором генетики – науки, яка вивчає спадковість, що є основою для розуміння всіх життєвих процесів. Однак як генетик, що перебував під впливом моїх вчителів у Львові і Гданьську, Копенгагені і Коулд Спрінг Харборі (Нью-Йорк), я завжди дивувався, як вдалося Менделю бути таким незалежним мислителем за відсутності у нього наставника, який міг би спрямувати його відкриття та аналітичний розум? Чи був хтось у житті Менделя, хто займав таке положення? У крайньому разі, чи була у нього можливість обговорювати свої експерименти з кимось із колег та одержувати допомогу від керівника або друга в аналізі отриманих результатів? У представленій статті зроблено спробу висвітлити історичні факти, які довгий час перебували в тіні, як маловідомий польський професор із Львівського університету Александр Завадські допоміг непомітному австрійському ченцю Менделю започаткувати основи генетики.

Ключові слова: Грегор Мендель, Александр Завадські, генетика.

В. Шибальські

Професор Львовського університету Александр Завадські – наставник и вдохновитель Грегора Менделя

Резюме

Общепризнано, что Йоганн Грегор Мендель является основателем генетики – науки, изучающей важнейшее для понимания всех жизненных процессов явление – наследственность. Однако как генетик, находящийся под влиянием моих учителей во Львове и Гданьске, Копенгагене и Коулд Спринг Харборе (Нью-Йорк), я всегда удивлялся, как удалось Менделю быть таким независимым мыслителем при отсутствии у него наставника, способного направить его открытия и аналитический ум? Был ли кто-нибудь в жизни Менделя, кто занимал такое положение? В крайнем случае, была ли у него возможность обсуждать свои эксперименты с кем-нибудь из коллег и получать помощь от руководителя или друга при анализе полученных результатов? В представленной статье сделана попытка осве-

тить долгое время находившиеся в тени истории факты, как малоизвестный польский профессор Львовского университета Александр Завадски помог незаметному австрийскому монаху Менделю создать основы генетики.

Ключевые слова: Грегор Мендель, Александр Завадски, генетика.

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