

František Josef Studnička (1836–1903)

Life and work of F. J. Studnička

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LIFE AND WORK OF FRANTIŠEK JOSEF STUDNIČKA

František Josef Studnička (1836–1903) was a Czech mathematician, a teacher and a popularizer of science. He published about 400 articles from various fields of mathematics, geography, astronomy, meteorology, physics and the history of science. The aim of this book is to inform the reader about Studnička's life and about his work in analysis, in the theory of determinants and quaternions as well as in some other fields. Studnička's work was published in Czech, German, French, Italian and Bulgarian.

The first chapter describes Studnička's father's and brother's life and work, and it also presents two small articles about Studnička's children. This chapter is based on the documents about the work of Studnička's father which can be found in the archives in Prague.

Many facts were reconstructed from the memoirs of Alois Studnička, František's brother, describing his life and work in Janov, from a number of articles published in many newspapers and from Czech Otta's Encyclopaedia. The information about the life of Studnička's children was gathered from the memoirs of František Karel Studnička (František Josef's son) and from their correspondence. The first chapter covers a brief description of the whole large family of Studnička. It mentions Studnička's daughters Bohumila (1866–1917), Růžena (1873–1957) and Ludmila (1875–1957) and Studnička's son František Karel (1870–1955) who was a famous biologist and medical doctor. All members of the family were very famous in their time, especially for their unusual activities connected with teaching and writing. Their goal was to contribute to the development of the Czech nation.

The second chapter presents František Josef Studnička's life and his scientific and pedagogical activities. František Josef Studnička was born on June 27, 1836 in Janov u Soběslavi (South Bohemia). His father František Xaver Studnička (1802–1882) was a primary school teacher in Janov. František Josef Studnička had many brothers and sisters: Cecilie (1832–1835), Marie (1834–1862), Cecilie (1838–1880), Alois (1842–1927) and Antonie (1848–1897). The family was very poor. At the age of five František Josef started his education in Janov. He was an excellent student. In the years 1848 and 1849 he privately attended a German school in Tábor and in 1849 he started studying at a secondary school in Jindřichův Hradec which was a very famous German grammar school. His remarkable talent for mathematics and for languages became evident there. He passed his examinations in 1857 and then he won a scholarship to study at the University of Vienna. He became a student of the Faculty of Philosophy there. Studnička attended the following courses: mathematics (Moth and Petzwal), physics (Kunzek and Ettingshauser), biology (Sues, Zippe, Kner, Fenzl and Unger), history and philosophy (Schenach, Anschbach and Bonitz), French (Gischig) and Polish (Kawecki). After four

years he passed the so-called "teacher examination" (1861) and he also became a Doctor of Philosophy (in the spring of 1861). He worked in the Institute of Physics in Vienna and he was a member of the Imperial and Royal Geographic Society.

In 1861 he was taken ill and therefore he returned home and became a teacher — a private teacher in Mayer's family who lived not far from Janov. It was a rich family and the farmer Jan Mayer liked František Josef Studnička very much. There Studnička got acquainted with a nice young woman Josefina Františka Walburga Pospíšilová (1836–1913) whom he later (1865) married.

In 1862 he got his first permanent job. He became a teacher at the German grammar school in České Budějovice. He stayed there for two years teaching mathematics, physics and stenography.

Then he applied for a position of an assistant of Professor Pierre at Charles University in Prague. He wanted to work as a physicist but the position was not given to him. At the same time he competed for a position of a lecturer of mathematics at the Technical College in Prague. He succeeded and became a lecturer of mathematics and mechanics. In 1865 he was appointed an extraordinary professor and in 1866 (after Professor Gustav Skřivan's death) he became a full professor. During the years 1869 and 1872 he was the head of the Department of Civil Engineering. At this time Studnička's scientific activities started. He published his first articles and he wrote the first Czech textbooks for his students. He started to change the system of education by preparing new curricula for the Technical College. After the new Czech Technical College was established (when the Technical College of Prague split) Studnička managed its library, its laboratories and its system of education.

Although Studnička was very successful in his work and even though he directed the teaching of mathematics at the Czech Technical College in Prague, his desire was to teach at the University. He was appointed a Professor of the University in Prague in 1871. He started to read mathematics in Czech. When the new Czech university was established (in 1882) Studnička left his previous post and became a professor there. In 1882–1883 he was the first Dean of the Faculty of Philosophy of the Czech University in Prague. In 1888–1889 he was the Rector of the University. In that period he published more than 100 papers, almost all of them in Czech journals (*Časopis pro pěstování matematiky a fysiky*, *Rozpravy České akademie věd císaře Františka Josefa pro vědy, slovesnost a umění*, *Sitzungsberichte der königlichen böhmischen Gesellschaft der Wissenschaften*). He wrote in Czech and German. He used to work on several topics at the same time, his aim was to improve the Czech university and Czech scientific life. This period was the culmination of Studnička's activities. He spent 33 years teaching at the University and he was interested mainly in the preparation of new Czech secondary school teachers. Studnička was famous for a wide spectrum of his lectures (analysis, geometry, algebra, number theory, history ...). However, the level of his lectures was not very high. He was also a mild and moderate examiner.

His work was difficult because he was the only professor of mathematics at

the Czech University. He had to teach all branches and he had to prepare all examinations. He founded new seminars called in Czech "seminář and proseminář". Studnička was also an examiner for candidates of teaching at grammar schools and he prepared new textbooks for grammar schools.

In 1871 he became a member of the Czech Royal Society of Science, in 1869 he was elected a protector of the Union of Czech Mathematicians and Physicists and in 1870 he became a founding member of the Union. In 1868 he was a member of "Jednota průmyslová ku povzbuzení průmyslu v Čechách" (Industrial union for encouraging industry in Bohemia). Studnička was a member of Museum, Svatobor, Matice, Club of Science, American women's Club, Club of the students of the Czech University in Prague, Club of stenography in České Budějovice etc. In 1890 he was named a member of the Czech Academy.

Studnička was known abroad as an organizer of Czech scientific life and scientific work in Bohemia. He was a member of Association Française pour l'avancement des sciences, L'Association Scientifique de France, Circolo matematico in Palermo, International Association for Promoting the Study of Quaternions and allied Systems of Mathematics, Moscow Mathematical Society, Société Royale des Sciences de Liège and Jugoslavenska akademija znanosti i umjetnosti.

Studnička had many deserts in the development of Czech education system and therefore he received several decorations. In 1886 he was decorated twice (the decorations "řád svatého Stanislava II. třídy" and "císařský rakouský řád železné koruny III. třídy"). In 1897 he was given a title "dvorní rada" (Hofrat) which was very famous in the Austro-Hungarian Monarchy. F. J. Studnička died on February 21, 1903 of pneumonia.

Studnička was a very energetic man. He was able to concentrate on solving several problems. He took a great care about the style of his papers and his books. Except Czech he spoke and wrote in German and Latin, and he read and spoke French, Polish and Greek. He was a mathematician but he also wrote about physics, meteorology, geography, the history of science, astronomy and philosophy. He was the most famous Czech man popularizing science in the last century.

The third part of the book gives the analysis of Studnička's work and activities. It contains articles and chapters about the following topics: Studnička's work about determinants and quaternions, Studnička's textbooks and his terminology, Studnička's mathematical seminar, Studnička's meteorology, his contribution to astronomy, Studnička's work on history, on physics and biology, on education system and his activities in various societies.

The chapter on his contributions to the theory of determinants is a wide study of this theory not only in Studnička's works but also in the works of other Czech authors. Studnička wrote about 70 articles and textbooks on the theory of determinants and this chapter presents his original opinions and goals as well as his elementary considerations, applications and historical comments.

A very long article is devoted to textbooks written by Studnička. As a teacher of mathematics he wrote textbooks for students at secondary schools,

and for students at the Technical College and at the University. During his lifetime he wrote 20 textbooks and texts (monographs) which can be used as textbooks. They include the following topics: calculus, algebra, geometry, the number theory, the theory of determinants, the theory of quaternions and insurance.

Studnička had a very difficult task because he wrote the first Czech textbooks on calculus and on the theory of determinants. He had to create the Czech terminology, he was opening the field for the future generations of Czech teachers and students. His textbooks were not of a high scientific level but they were necessary for the future development of Czech education and Czech science. The article analyses all of his textbooks and compares them with forthcoming Czech textbooks (written by Weyr, Petr, ...). The article points out some of terminological and mathematical problems which Studnička encountered in the books. From the theoretical point of view, the textbooks were not of a high level; they were old fashioned, written in the style of Euler from the 18th century. Studnička did not take into account new developments of the 19th century.

The textbooks about the determinants were famous in our country as well as abroad. These books can be divided into two groups — monographs and special theoretical works. Studnička wrote the first Czech monograph on determinants. As the theory of determinants was very popular during the last century, Studnička won many prizes for Czech teachers and writers with them.

Other textbooks (concerning algebra and geometry) were typical textbooks describing the problems studied at secondary schools now. The textbooks on geometry were written for candidates of teaching and for talented students. The books concerning algebra were written for grammar schools. This article comments all these textbooks and all Studnička's working methods which meant a great contribution to the development of education in these fields.

The chapter on meteorology describes the work of Studnička in this subject. He wrote popular articles explaining some meteorological phenomena and the problems of meteorological observations. He was a member of the Czech Museum and he participated in activities of various committees studying the Czech country. In 1873 Studnička directed a commission to measure rainfall in Bohemia (the name of that commission was "Dešťoměrný výzkum Čech"). He created a wide system of observations for studying all aspects of rain and he made news reports based on them. The text also contains some reviews of his works which appeared in different Czech and German journals. This chapter presents Studnička not only as an author of reports and popular books but also as a great organizer of science.

The article about Studnička's astronomy analyses his papers and books about this theme. Studnička was not an astronomer but he was an author of popular books, lectures and articles concerning astronomy for which he was very famous. During 1860's the number of Czech articles and books popularizing astronomy increased considerably. František Josef Studnička started with this work in 1862 and he continued in it to the end of his life. This chapter

describes all his astronomical work, it analyses his working methods and subjects presented by him. The following topics are dealt with: the solar system, galaxies, planets, the Sun, comets, the Moon, meteors, the foundation of the universe and stars. Studnička's texts concerning astronomical popularization are compared with scientific astronomical theories. His opinions are analysed in comparison with the common scientific opinions of the last century. We can see the development of Studnička's opinions on the problems of astronomy in the whole course of his lifetime as he followed new discoveries and trends in science. This brief chapter critically evaluates Studnička's astronomical works and his contribution to the development of the education of our nation in the last century.

The chapter on other Studnička's work can be divided into the following groups: historical texts and books, articles on physics, biological articles, articles about Studnička's opinions on education and textbooks for students, and didactical and mathematical articles published by Studnička in the Czech journal "Časopis pro pěstování matematiky a fyziky".

Studnička was widely interested in science and its history. He wrote some books and articles which can be characterized as both popular and scientific. His work concerning this topic can be further divided into some groups. The first one is formed by his work on the history of the theory of determinants. The second group concerns lectures and celebrating biographies of famous Czech and foreign scientists. Studnička wrote biographies of Newton, Leibniz, Gauss, Copernicus, Purkyně, Marci, Tycho and Vydra. These texts were created for different lectures. The third group consists of short articles published in "Časopis pro pěstování matematiky a fyziky". Studnička wrote about mathematics in Ancient times (Egypt, Mezopotamy, Greece and Islamic world), about the theory of equations and the number theory, about analysis and geometry. He presented a lot of nice and interesting historical problems. He also wrote about some Czech mathematicians and their work. He published Tycho Brahe's works which he or his colleagues had looked up in different libraries in Prague. Studnička was a great expert on the history of science. He tried to prove that many famous scientists were of Slavonic or Czech origin, which was typical in our country of that time as the Czech national renaissance was culminating. Some of Studnička's work described historical problems like the foundation of the Czech Academy. The majority of these publications was written in Czech, only a few of them was presented in German.

The part concerning Studnička's works about biology and physics is short because the majority of them is purely popularizing. These works were published in Czech newspapers and magazines and their scientific level is very low. They celebrate the beauty of our country and give instructions to learn something about our home land.

The last part of this chapter describes Studnička's opinions on the school system and education. There are many quotations included in this part because they show a lot of Studnička's opinions and thoughts which were very interesting and modern for his time.

An article about papers published in "Časopis pro pěstování matematiky a fysiky" forms an independent part. These texts can be divided into two groups. The first group concerns scientific articles and the other group presents articles oriented toward teachers and students. These texts are dealt with according to their mathematical contents. Studnička wrote about algebra, geometry and analysis. Texts of this type occurred during all his lifetime but most of them originated between 1872–1882 when Studnička was an editor of the "Časopis pro pěstování matematiky a fysiky". However, Studnička supported this journal by papers during all his lifetime when he wrote 104 papers concerning mathematics, history and didactics.

The article about Studnička's other activities describes his work, lectures and his activities in various clubs, societies and scientific organizations, such as the American women's Club, the Czech Royal Society of Science, in the Union of Czech mathematicians and physicists, the Czech Museum, Svatobor, the Club of Czech scientists in Prague, the Czech Academy, in the Society of Czech Students at the Czech Faculty of Philosophy, in the editorial board of Otta's Encyclopaedia. Every part of this article is devoted to one of the societies. It describes their history, work and aim, and then it mentions Studnička's activities and his positions in the organizations.

According to this information and with respect to the documents presented we can see that Studnička worked very hard and that he essentially influenced our culture and the development of mathematics and its terminology in our country.

The fourth part of this publication contains some documents concerning Studnička's life and work. It presents the list of his writings, the list of his pedagogical activities at the Technical College in Prague and at Charles University, the list of Studnička's reviews in Czech journals and the list of Studnička's students who became doctors. The last chapter of this part is devoted to Studnička's correspondence. All of the documents illustrate his wide activities directed toward Czech education and toward Czech science and scientific work.

The fifth part contains Studnička's photographs and the photographs of his family, the photocopies of title pages of his publications and the photocopies of his diplomas.

Translated by Štěpánka Bilová