

The growth of mathematical culture in the Lvov area in the autonomy period (1870–1920)

Societies, conventions, publications

In: Stanislaw Domoradzki (author): The growth of mathematical culture in the Lvov area in the autonomy period (1870–1920). (English). Praha: Matfyzpress, 2011. pp. 204–235.

Persistent URL: <http://dml.cz/dmlcz/402158>

Terms of use:

© Stanislaw Domoradzki

Institute of Mathematics of the Czech Academy of Sciences provides access to digitized documents strictly for personal use. Each copy of any part of this document must contain these *Terms of use*.



This document has been digitized, optimized for electronic delivery and stamped with digital signature within the project *DML-CZ: The Czech Digital Mathematics Library* <http://dml.cz>

SOCIETIES, CONVENTIONS, PUBLICATIONS

4.1. Introduction

Popularization of mathematical sciences has been taking place at scientific gatherings of numerous existing societies, Conventions of Naturalists and Physicians as well as through publications in journals. Mathematicians from Lvov published in the journals of Cracow, Warsaw, Paris as well as in international scientific journals.

Józef Dietl¹⁰⁶ during the 1st Convention of Naturalists and Physicians in Cracow in 1869 said: [...] *the matter is only that despite being scattered all around the country we should be able to find ourselves in this place, regain the sense of our strength, vitality and integrity, which we have been deprived of by the century-long oppression of relations unfriendly to us...*

The meetings like conventions of Polish scientists in the 19th century should be viewed as a structure of gatherings existing beyond the partisan borders supposed to *Walczyć nauką za sprawy ojczyzny* [To fight with science for motherland's causes]¹⁰⁷.

4.2. Lvov scientific societies and their transformations after 1918

In the times of the autonomy, there were numerous active scientific societies in Lvov. They had connections with the University or the Polytechnic School (the previous name of the Polytechnic in Lvov) through professors, but on the basis of their statutes approved in Vienna they operated on their own. It is worth adding that obtaining the approval of Austrian authorities was not easy. The Mathematical Society was founded quite late (in 1917) in relation to other societies. Some mathematicians conducted scientific and organizational activity in other societies. The works of the Mathematical Society in Lvov are little known; its establishment is mentioned in, among others, [Duda, 2007] and [Kuratowski, 1973].

¹⁰⁶ Józef Dietl (1804–1878), Polish physician, politician, professor, Rector of the Jagiellonian University, president of Cracow in 1866–1874.

¹⁰⁷ The title of a poem from 1881 by W. Anczyc and the title of the book: J. Cabaj, *Walczyć nauką za sprawy ojczyzny*, Wydawnictwo Akademii Podlaskiej, Siedlce, 2007.

Let us list in a chronological order those Lvov scientific societies which at the end of 1919 in the Second Republic of Poland formed a union named *Związek Polskich Towarzystw Naukowych we Lwowie* [Union of Polish Scientific Societies in Lvov]. These societies were founded in the age of autonomy. The achievements of Lvov in this matter are impressive, also due to mathematicians' activity.

Towarzystwo lekarzy galicyjskich [Society of Galician Physicians] – founded in 1868;

Towarzystwo Prawnicze [Law Society] founded in 1868, the aim of this society was to *pursue legal and social sciences in theory and practice in the national spirit*;

Towarzystwo Historyczne [Historical Society] founded in 1886;

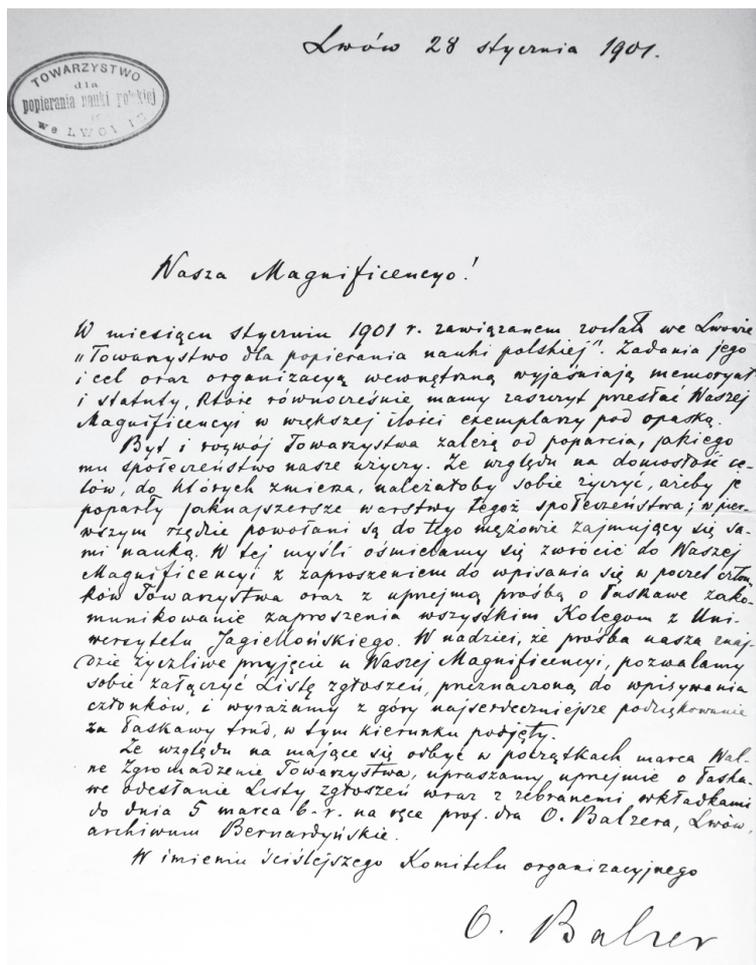
Towarzystwo literackie im. Adama Mickiewicza [Adam Mickiewicz Literary Society] founded in 1886;

Towarzystwo Przyrodników imienia Kopernika [Copernicus of Society Naturalist] founded in 1874; the Society was established on the occasion of the 400th anniversary of Copernicus's birthday (1873). The Society had its own periodical, named *Kosmos* [Cosmos] which published works on, among others, mathematics. The *Kosmos* journal was founded by the Polish Naturalists Society in Lvov in 1876. The editorial board also kept a chronicle of scientific societies, published articles on special occasions and news. In several issues *Sprawozdania z prac matematycznych polskich* [Reports on Polish mathematical works] written by S. Dickstein, S. Kępiński, Z. Krygowski, S. Zaremba, K. Żorawski, W. Burtan¹⁰⁸ were published in *Kosmos*. The authors of publications were, among others, W. Żmurko, P. K. Skibiński, A. Raciborski, F. Rauch, W. Gosiewski, W. Zajączkowski, S. Dickstein, J. Puzyna.

Towarzystwo Politechniczne [Polytechnical Society] founded in 1887; its task was, among others, to associate employees of all branches of technical sciences for the purpose of their development and to enhance their significance in public and private life. The founders of the Polytechnical Society were eminent mathematicians: Jan Nepomucen Franke and Karol Maszkowski, the professors of the Polytechnic School in Lvov. In 1877 the Polytechnic Society had 231 members, in 1913–1919 during the war about 800 and in revived Poland there were about 900 members. Since 1874 the Society published its periodical, titled *Czasopismo Techniczne* [Technical Journal], in the years 1877–1882 it was titled *Dźwignia* [Lever]. One of the editors of the journal was P. Dziwiński, a mathematician. In *Czasopismo Techniczne* mathematicians published their works.

¹⁰⁸ There weren't many such reports considering the years of *Kosmos*'s existence. Specifically, there were three of them in years 1901, 1902, 1904.

Lwowskie Towarzystwo Lekarskie [Lvov Medical Society] founded in 1887;
Towarzystwo filologiczne [Philological Society] founded in 1892;
Towarzystwo ludoznawcze [Anthropological Society] founded in 1895;
Towarzystwo dla popierania nauki polskiej [Society for Supporting Polish Science] founded in 1901. In 1920 it was transformed into **Towarzystwo naukowe we Lwowie** [Lvov Scientific Society]. Since the beginning of its existence the Society had two faculties: the historical-philosophical faculty and the mathematical-natural faculty.



The letter of Oswald Balzer to the Rector of the Jagiellonian University with the information about the Society and a request to become its member as well as to inform the academic community of the Jagiellonian University about this endeavor (from the Jagiellonian University Archive).

Polskie Towarzystwo Filozoficzne [Polish Philosophical Society] founded in 1904;

Towarzystwo Miłośników Przeszłości Lwowa [Society of Enthusiasts of Lvov's Past] founded in 1906;

Towarzystwo Heraldyczne [Heraldic Society] founded in 1908;

Polskie Archiwum Wojenne [Polish War Archives] founded in 1915 for the purpose of documenting the events of the World War I;

Towarzystwo opieki nad zabytkami sztuki i kultury [Society for Protecting Monuments of Art and Culture] founded in 1916;

Towarzystwo Matematyczne we Lwowie [Lvov Mathematical Society] founded in 1917;

Towarzystwo Filologów Nowożytnych [Society of Modern Philologists] founded in 1918.

17 societies existing at that time decided upon belonging to the Union of Polish Scientific Societies. In June 1920 a delegation was formed. It was composed of the representatives of the societies and they elected the Board of the Union as follows:

— **President:**

Stanisław Rybicki (Polish Polytechnic Society).¹⁰⁹

— Vice-presidents:

Prof. Dr Jan Hirschler (Polish Copernicus Naturalists Society).

Prof. Dr Stanisław Witkowski (Polish Philological Society).

— **Secretary:**

Prof. Dr Witold Nowicki (Lvov Medical Society).

— **Treasurer and administrator:**

Józef Białynia Choiodecki (Society of Past Lvov Enthusiasts)

— **Members of the Board:**

Prof. Dr Oswald Balzer (Scientific Society).

Prof. Dr Marcin Ernst (Mathematical Society).

Prof. Dr Ludwik Finkel (Historical Society).

Dr Adam Fischer (Anthropological Society).

Prof. Dr Jan Kasproicz (Scientific and Literary Union).

Prof. Dr Emanuel Machek (Society of Polish Physicians of former Galicia).

Prof. Dr Edward Porębowicz (Society of Modern Philologists).

Zygmunt Luba Radziwiński (Heraldic Society).

Prof. Dr Ernest (Law Society).

Prof. Dr Kazimierz Twardowski (Philosophical Society).

Dr Stefan Wierczyński (Polish War Archive).

Prof. Dr Jan Sas Zubrzycki (Society for Protecting Monuments of Art and Culture), (See Z. Czerny, 1921).

¹⁰⁹ Most of the societies added the adjective "Polish" to their names after 1918.

The Union published two issues of *Sprawozdanie związku polskich towarzystw naukowych we Lwowie* [Report of the union of Polish scientific societies in Lvov]. The first issue contained reports on the societies' activities until 1919 and the second one covered their activity in 1920. A short note on each society's origin, its makeup and the list of meetings and publications were included. The above-mentioned societies are clearly characterised by actions aiming at fighting for Poland with science.

4.3. Other Lvov societies

The great professional movement of secondary-school teachers has to be emphasized, for example in 1868 in Galicia **Towarzystwo Pedagogiczne** [Pedagogical Society] was founded, out of which the elitist **Towarzystwo Nauczycieli Szkół Wyższych** [Society of Higher School Teachers] was formed in 1884 (it concerned secondary schools), called **Towarzystwo Nauczycieli Szkół Średnich i Wyższych** [Society of Secondary and Higher School Teachers] in the times of II Republic of Poland. It published the *Muzeum* journal in which we find works on mathematics, its didactics and history. The articles published in this journal had a great impact on attempts in modernization of teaching programs of mathematics.

What is interesting, there was also **Towarzystwo Szkoły Handlowej** [Society of Trade School] founded in 1908, aiming at, among others, *proper understanding of professional education, opposing the hegemony of schools of general education*.

The Austrian constitution from 1868 allowed the Pedagogical Society in Lvov to be established. Among the founding members there were professors from the Lvov University, Polytechnic School, folk schools and Secondary schools. The society dealt with teaching problems at various stages of education, with the priority being, however, the elementary level. In 1883 there was an attempt to form a secondary school section. This process caused disruption within the Pedagogical Society, and the Society of Higher School Teachers was founded with its board located in Lvov and its activity spread to Galicia, Bukovina and Austrian Silesia. The expression *secondary school* was not used in the name of the society so that it would not be associated with something mediocre, since gymnasia were the first step towards higher education leading to a university or a polytechnic¹¹⁰. Viennese ministry of education was not really supportive in relations to problems with which teachers of secondary schools had to deal. Let us remember that after

¹¹⁰ See B. Łuczyńska, *Krakowskie Koło TNSW na tle prac Towarzystwa Nauczycieli Szkół Średnich i Wyższych 1884–1939* [Cracow Circle of Society of Higher School Teachers in comparison with works of Society of Secondary and Higher School Teachers], UJ, Rozprawy habilitacyjne nr 226.

the introduction of the Act on Polish language of instruction in folk secondary schools in Galicia in 1867, there was a quite rapid development of education on that level. The activities of the Society were led by many professors including professor Kazimierz Twardowski (1866–1938)¹¹¹, who contributed to the finest period of this organization in 1905–1911. His greatest achievements can be noticed in the matters concerning national education and, above anything else, issues connected with nationalization of schools. It is nearly obligatory to mention that Kazimierz Twardowski was the promoter of the doctoral dissertation of Stefan Banach (the reviewers were H. Steinhaus, E. Żyliński).

In 1885 in Lvov the Society of Higher School Teachers brought to life a monthly periodical – *Muzeum*. Apart from short reports from articles appearing in other publications it contained interesting didactic, popular-scientific as well as scientific pieces of work. For instance, J. Puzyna wrote *O tak zwanych miejscach skupienia i ich zastosowaniu w analizie* [On so-called points of concentration and their use in analysis]. In 1905 the Society established the Committee for Secondary School Reform in the area of the Austrian annexation. In *Muzeum*¹¹² the program of this Committee was published under the title *Nasza szkoła średnia, krytyka jej podstaw i konieczność reformy* [Our secondary school, criticism of its foundations and necessity of reform]. With regard to mathematics the program was specific, in accordance with the principles of didactics valid for that time. The program was required *to significantly limit the teaching content and to distribute it differently in time; to stop teaching many different things and to teach fundamentals thoroughly; to avoid examples which can be solved in a simplistic way, to do a large number of simple exercises in calculation which require logical thinking; to organize the teaching process so that it would create conditions for deepening the knowledge of algebra;*

¹¹¹ Logician, philosopher, founder of Lvov Philosophical School. He was born on 20th October 1866 in Vienna, he was a son of a higher-rank clerk in the Austrian Ministry of Treasury. He completed secondary school in Vienna, in 1885–1889 he studied philosophy at the Vienna University. He continued supplementary studies in Leipzig and Munich. In 1892 he received his PhD degree at the Vienna University on the basis of the dissertation entitled *Idee und Perzeption. Eine erkenntnistheoretische Untersuchung aus Descartes*. Next he found employment at the office of the Viennese Insurance Company. In 1894 he received the degree *doktor habilitowany* at the Viennese University on the basis of the dissertation entitled *Zur Lehre von Inhalt und Gegenstand der Vorstellungen*. He gave lectures there as a private docent in the academic year 1894/95. In November 1895 he came to Lvov and took over the Institute of Philosophy at the Lvov University; he remained there until 1930 and after that he became an honorary professor. The date of his takeover of this institute is widely accepted as the date of establishment of the Lvov-Warsaw philosophical school. His disciples were, among others, Łukasiewicz and Leśniewski. In 1918–1930 within the school founded by him the Warsaw logical school emerged, which gained international approval; it was a co-creation of logicians and mathematicians and it has been treated as a part of Polish mathematical school. He died on 11th February 1938 in Lvov.

¹¹² Book 2, (1906), p. 139.

when teaching geometry and theoretical arithmetic, to use the heuristic method to the fullest; to base the teaching of algebra on the notion of function which has been accepted as indispensable for proper understanding of mathematics and for applications in physics; to elaborate new geometry handbooks.¹¹³ The program presented in *Muzeum* initiated quite a long discussion lasting practically until the outbreak of World War II.¹¹⁴ The authors involved were, among others, L. Böttcher¹¹⁵, A. Hoborski¹¹⁶, L. Zarzecki¹¹⁷, after 1918 S. Kulczycki¹¹⁸, S. Zaremba¹¹⁹, B. Bielecki¹²⁰. The list of articles can be found in the Appendix.

For the mathematical culture, *Muzeum* played a role which cannot be overestimated. Didactic problems, problems motivating teachers to do their professional duties in the best and fullest possible way along with the attempt to distinguish teaching mathematics and other subjects, new currents in teaching, recommendations of textbooks – we can find all that in publications in “*Muzeum*”. The above-mentioned L. Böttcher referred to physicists’ work in which the achievements of modern physics could be in a way realized in secondary schools. He was a great supporter of covering the integral and differential calculus instead of continuous fractions and indeterminate equations in a secondary school. Let us quote an excerpt to present the spirit of Böttcher’s publication. *I would think*

that on the occasion of a lecture on geometry one might discuss the rules of differential calculus on parabola $y = \frac{a^2}{x}$, on hyperbola $y = \frac{x^2}{2p}$, on logarithmic: $y = a^x$, $y = \lg x$ not in a sort of fundamental way as a formula but in a graphical way combined with understanding. It is good if the pupil notices certain things on his own; it will be a sign for the supervisor that his work has been accepted

¹¹³ See *Polska myśl dydaktyczna w dziedzinie nauczania matematyki w 20-leciu międzywojennym*, [Polish didactic thought in the field of teaching mathematics in the interwar period]. UMCS, Lublin, 1988.

¹¹⁴ More on these issues in K. Wuczyńska’s doctoral dissertation *Realizacja programu merańskiego w średnich szkołach w Polsce w latach 1918–1930 w świetle podręczników matematyki dla szkół średnich* [Realizing Meran programs in secondary schools in Poland in the years 1918–1930 in the light of mathematics handbooks for secondary schools], WSP w Krakowie, 1979.

¹¹⁵ *Kilka uwag w sprawie reformy nauczania matematyki* [Several remarks concerning mathematics teaching reforms], *Muzeum*, 1907, z. 2, pp. 163–168.

¹¹⁶ *O nowym projekcie reformy nauczania matematyki w szkołach średnich* [On a new project of mathematics teaching reform in secondary schools], *Muzeum*, 1908, z. 3, pp. 339–342..

¹¹⁷ *O programie matematyki proponowanym przez Komisję Krakowską* [On mathematics program proposed by the Cracow Committee], *Szkoła*, 1908, pp. 231–243.

¹¹⁸ *O tzw. zadaniach na dyskusję* [On the so called exercises for discussion], *Przegląd Pedagogiczny*, 28(1927), p. 666.

¹¹⁹ *Uwagi o nauczaniu matematyki w szkołach średnich* [Remarks about teaching mathematics in secondary schools], *Muzeum*, 1923, z. 2, pp. 145–147.

¹²⁰ *W sprawie programów matematyki w naszych szkołach średnich* [On mathematics programs in our secondary schools], *Przegląd Pedagogiczny*, (3)1923, p. 204.

in the pupil's mind. In this and another article in *Wszechświat*¹²¹ [Universe] he discussed the issue of extending the teaching program of mathematics, which he wanted to base on the notion of function – *the basic element of mathematical thought* and on *three basic operations: differentiation, integration, development into series: power series through differentiation and trigonometric ones through integration*.

Let us devote a few words to the dissertation by W. E. Wierzbicki *O liczbach André'go i ich związku z liczbami Bernoulli'ego i Eulera* (part I) [On André's numbers and their relations to Bernoulli's and Euler's number] included in the Report of II Real School in Lvov for the school year 1907. This piece of work was reviewed by another teacher, Kazimierz Strutyński from Kołomyja.

Część I. rozprawki obejmuje następujące tematy: permutacje faliste; wzór ogólny na liczbę permutacji falistych; rozwinięcie funkcji $\operatorname{tg} x$ i $\operatorname{sec} x$ w liczbach André'go; rozwinięcie funkcji $\operatorname{cotg} x$ i $\operatorname{cosec} x$ w liczbach André'go; związek liczb André'go z liczbami Bernoulli'ego i z liczbami Eulera, a wreszcie przykłady na liczby André'go. Rozprawka napisana przystępnie i treściwie, więc mogłem ją nawet uczniom do przeczytania polecić, ale muszę zwrócić uwagę autora na kilka błędów drukarskich, które nie powinny znajdować się w tak małej rozprawce, n. p. na str. 7. w w. 8. z dołu ma być A_3 , a nie A_2 ; na str. 9. w w. 2. z góry ma być $2 \operatorname{tg} x$, a nie $2 \operatorname{ig} x$; na tejsze strony w w. 6. z góry ma być $\operatorname{tg} \left[\frac{\pi}{4} + \frac{x}{2} \right] + \operatorname{tg} \left[\frac{\pi}{4} - \frac{x}{2} \right] = 2 \operatorname{sec} x$, a nie $\operatorname{tg} \left[\frac{\pi}{4} + \frac{x}{2} \right] + \operatorname{tg} \left[\frac{\pi}{4} - \frac{x}{2} \right] = 2 \operatorname{sec} x$; na str. 11. w w. 11. z góry ma być A_3 , a nie A_4 ; na tejsze strony w w. 14. z góry ma być: $\left[\frac{A_1}{2} - \frac{A_1}{2^2 - 1} \right] \frac{x}{1!}$, a nie $\left[\frac{A_1}{2} - \frac{A}{2 - 1} \right] \frac{x}{1!}$. Jeszcze jedna uwaga. Autor zdaje się przeoczyć jeden błąd przy omawianiu permutacji falistych. Na str. 5. powiada: „Z trzech elementów a_1, a_2, a_3 można utworzyć cztery faliste permutacje; dwie o początkowym wzniesieniu, a dwie o początkowym spadku:

$$\begin{array}{ccc} a_1 & a_3 & a_2 \\ a_2 & a_3 & a_1 \end{array} \quad \begin{array}{ccc} a_2 & a_3 & a_1 \\ a_1 & a_3 & a_2. \text{“}$$

Przecież tu wszystkie cztery permutacje mają początkowe wzniesienie, jeżeli przyjmiemy, że „dwa elementa (nb. powinno być elementy) a_m, a_n , w takiej permutacji obok siebie stojące, tworzą spadek, jeśli $m > n$,

An excerpt from the review in which the author discusses the subject matter of the piece of work and notices errors in a detailed way.

The reviewer agrees with L. Böttcher that part of the material is dispensable in the teaching program, he also supports the view that it would be a good idea to get a gymnasium pupil acquainted with differential and integral calculus.

It is extremely interesting that the reviewer recommended Wierzbicki's work to one of the pupils from the self-education circle, when they were working on the differential calculus and particularly while attempting to develop trigonometric functions into power series.

¹²¹ 35(1917), vol. XXVI, pp. 545–549.

4.4. Conventions of Polish Naturalists and Physicians

At the end of the 19th century the place for meetings of naturalists and doctors were the Conventions. During these conventions a mathematical section was formed. Materials from the conventions appeared in *Dzienniki* [Journals]. The majority of works in *Dzienniki* consisted of medical and pharmaceutical content. The first Convention of Polish Naturalists and Physicians took place in Cracow in 1869¹²². In Europe, conventions of this type had been already taking place for half a century. The aims of the conventions were twofold: social and scientific, within the range of medical sciences, hygiene and prevention. The first convention passed, among others, a resolution concerning the need for establishing an institute of hygiene at the Jagiellonian University and introducing a compulsory lecture on hygiene in teachers' and theological seminaries, technical academies, in secondary schools of various kinds, popular lectures and publishing handbooks of hygiene for folk schools and teachers' seminaries. The first conventions debated in medical sections (medical-clinical, public medicine, chemical-pharmaceutical) and a natural one. In time more sections were established. As we have already mentioned, the first convention took place in Cracow (1869), the second one in Lvov (1876), the third in Cracow (1881), the fourth in Poznań (1884, it was the only convention which took place outside Cracow and Lvov), the fifth in Lvov (1888), the sixth in Cracow (1891). During the VI Convention of Polish Naturalists and Physicians a physical-mathematical section emerged from the natural sections (botanic, anthropologic, chemical and psychological sections) led by a physicist, professor A. Witkowski. Six papers were connected with mathematics. Three of them were presented by S. Dickstein: *O bibliografii nauk matematycznych* [On the bibliography of mathematical sciences], *Projekt nowej bibliografii matematycznej polskiej XIX stulecia* [A project of new Polish mathematical bibliography of the 19th century], *W sprawie badań nad historią wiedzy w Polsce* [On research in the history of knowledge in Poland]. W. Gosiewski: *O zależności zjawisk ze stanowiska teorii prawdopodobieństwa* [On dependence of phenomena from the point of view of the probability theory] and J. Puzyna: *Z teorii funkcji* [From the theory of functions], a speaker named Żurawski: *O zbieżności jednego z szeregów Wrońskiego* [On convergence of one of Wroński's series].

Five physicists presented 10 papers. On the occasion of conventions natural-medical exhibitions were organized.

¹²² See *Dziennik drugiego Zjazdu Lekarzy i Przyrodników Polskich* [Journal of the second Convention of Polish Naturalists and Physicians].

VII Convention of Naturalists and Physicians took place in Lvov (23rd–26th July 1894)

VII. Zjazd lekarzy i przyrodników polskich

odbędzie się we Lwowie **od 23. do 26. Lipca 1894**, a nie 18. do 21. Lipca 1894, jak to pierwotnie t. j. w czerwcu 1893 postanowionem było. Zmiana terminu Zjazdu nastąpiła na życzenie Dyrekcyi powszechnej Wystawy krajowej a to dla uniknięcia kolidy z innemi Zjazdami na Lipiec r. b. we Lwowie zapowiedzianemi.

Wydział gosp. Zjazdu wydał następujący okólnik:

„Do udziału w tym Zjeździe mamy zaszczyt zaprosić Wielm. Pana a zarazem, zawiadomić Go, że oprócz dwóch Ogólnych Zgromadzeń Zjazdu odbywać się będą posiedzenia sekcyjne. Przedmiotem tych posiedzeń będzie nie tylko podanie do ogólnej wiadomości wyników własnych badań członków Zjazdu, ale także przedstawienie najżywotniejszych spraw o ile możności z wszystkich gałęzi wiedzy lekarskiej i przyrodniczej, a to przez uproszonych do tego lub zgłaszających się referentów.

W razie zamierzonego podania takich komunikatów upraszamy o przesłanie ich tytułów pod adresem gospodarza sekcji najdalej do 25. Czerwca 1894.

Zarazem zwracamy uwagę każdego prelegenta, że w pamiętniku Zjazdu mogą być umieszczone tylko streszczenia prac przedstawionych na Zjeździe i tylko wtedy, jeżeli autorowie dostarczą gospodarzowi sekcji przed rozpoczęciem posiedzenia zupełnie do druku przygotowany rękopis.

Gdyby który z prelegentów potrzebował do objaśnienia swego wykładu jakichkolwiek środków pomocniczych lub miał jakie szczególne życzenia, prosimy o wcześniejsze powiadomienie gospodarza sekcji celem możliwego uwzględnienia“.

Lwów, dnia 14. marca 1894.

Dr. Józef Merunowicz, *Dr. Emil Habdank Dunikowski,*
Przewodniczący Wydziału gospod. Zjazdu.

Dr. Józef Siemiradzki, *Dr. Edward Mukowicz,*
Sekretarze Zjazdu.

The information above concerns the change of the date of the VII Convention of Physicians and Naturalists (from Kosmos 19(1894))

Papers were presented by S. Dickstein – *Kilka słów o literaturze matematycznej polskiej w ciągu dwudziestolecia 1873–1893* [A few words about Polish mathematical literature during 1873–1893]. It is worth taking a look at the statistical data from this paper: 459 pieces of work appeared in the described period out of which, according to the classification agreed upon during the Congress of Mathematical Bibliography in Paris in 1879, 144 on analysis, 62 on geometry, 195 on mechanics, physics and astronomy, 45 on philosophy and

history of mathematics, 14 concerned graphical calculi, tables and tools. The largest number of works were published in Cracow, then in Warsaw, Paris, Lvov and other smaller cities and towns of Galicia. Other presented papers:

S. Dickstein – *O liczbach e i π* [On the numbers e and π] (see chapter VI in this book);

W. Gosiewski – *Wywód elementarny reguły najmniejszych kwadratów* [Elementary deduction of the rule of least squares];

J. Petryk – *Krytyczny przegląd prac dokonywanych dotychczas nad falami elektrycznymi, poczynając od doświadczeń Hertza* [Critical review of works on electrical waves beginning with Hertz's experiments].

VIII Convention of Naturalists and Physicians was to be held in Poznań (12–14th July 1898)^{123,124}. The Convention did not take place; this is confirmed by researching journals, e.g. *Nowin Lekarskich* [Physicians News].

IX Convention of Naturalists and Physicians took place in Cracow (21st–24th July 1900). The convention debated in 22 sections. In mathematical-physical section with astronomy papers were presented by:

Samuel Dickstein – *O teorii liczb* [On the theory of numbers];

Jozef Puzyna – *Z teorii całek algebraicznych* [From the theory of algebraic integrals];

K. Żorawski – *O zachowaniu ruchu wirowego* [On preservation of rotational motion], in which he made reference to geometric results of Helmholtz concerning rotational motion: 1) *Linie wirowe przechodzą w linie wirowe* [The Rotational lines change into rotational lines],

2) *Moment wiru podczas ruchu nie zmienia się* [The moment of rotation does not change during motion].

Żorawski noticed that with this general understanding of motion of liquids the applications of theorem 1) are wider than of theorem 2). His reasoning is of geometrical nature which beautifully shows the use of mathematics in sciences being the subject of debate.

L. Grabowski – *O analizatorze harmonicznym Henrici'ego i Coradi'ego* [On Henrici's and Coradi's harmonic analyzer]. Coradi, a mechanical engineer from Zurich, developed in a mechanical way a function of one real variable into Fourier series, given its graphical transformation; *O okresie Algola* [On Algol's period] (in astronomy, paper connected with the previous one).

Gustaw Kłodnicki – *Własności anharmoniczne 3-go stopnia* [Anharmonic properties of 3rd degree], the author devoted his paper to the proof and application

¹²³ See *Nowiny Lekarskie* [Physicians News], X(1898), the organ of the Medical Faculty of the Poznan Society of Friends of Science.

¹²⁴ *Nowiny Lekarskie* [Physicians News] from 1907 inviting to the convention to Lvov informed that the Prussian government refused a permit shortly before the opening date of the Convention.

of the Halphen's formula which expresses the anharmonic relation of a bundle of rays created by connecting appropriate points of a general third degree curve.

Lucyan Böttcher – *Równania funkcyjne podstawnicze* [Functional substitutive equations]; the author considers equations of the type: $\Phi\{u(z), u(z_1)z\} = 0$, where Φ is an algebraic, rational, or entire function, the function $u(z)$ is unknown, $z_1 = f(z)$ describes a certain known algebraic function.

Physicists' papers were represented by M. Smoluchowski, W. Natanson, M. Rudzki – *O ruchu obrotowym ziemi* [On rotary motion of the Earth]. In this paper he summarized the results of Volterra's research concerning the theory of rotary motion).

The Sejm (Parliament) of the Kingdom of Galicia and Lodomeria granted the Convention 1000 złr. The convention fee was 10 złr (rhenish zlotys) and half that amount for companions.¹²⁵

X Convention of Polish Naturalists and Physicians took place in Lvov (22nd–25th July 1904)¹²⁶

The program of the Convention encompassed 27 sections and in the Mathematical-Physical Section the papers were presented by:

Lucyan Böttcher (Lvov) – *Z dziedziny teorii równań funkcyjnych* [From the field of theory of functional equations]; the author reviewed a certain type of functional equations which he considered during the previous Convention.

Władysław Gosiewski (Warsaw) – *O wartości indukcji z punktu widzenia prawdopodobieństwa* [On the value of induction from the point of view of probability];

The author made reference to chapter IV of his monograph *Zasady rachunku prawdopodobieństwa* (Principles of probability calculus) (Warsaw, 1906), where he described induction as deduction about eventuality from the premise of actuality. He gave a formula for the probability of validity of a deduction about eventuality of b made directly from the premise of actuality of a. References to astronomy should be noted.

Stanisław Zaremba (Cracow) – *Nowa metoda do uzasadniania podstawowych własności funkcji Greena* [A new method for justification of basic properties of Green's function]; this paper was published in *Wiadomości Matematyczne* [Mathematical News] (1907).

¹²⁵ See *Wiadomości Matematyczne* IV(1900).

¹²⁶ The Congress was planned to be held in 1903, however in that year there were Congresses of Physicians in Madrid and Cairo as well as a of geologists in Vienna.

Józef Puzyna (Lvov) – *Uwagi o liniowym równaniu całkowym* [Remarks on linear integral equation]; the author described the Lie continuous group, an issue concerning certain given series of function values depending on linear elements of equations was to be reduced to solving linear integral equation.

Kazimierz Żorawski (Cracow) – *O pewnym związku dotyczącym równań różniczkowych cząstkowych rzędu pierwszego* [On a certain relation concerning first order partial differential equations], the author informs that C. N. Haskins in his two dissertations: *On the invariants of quadratic differential forms* (Trans. of the Amer. Math. Soc. 3(1902), 5(1904)) considered the same problem for n -dimensional varieties which in case of two dimensions was the subject of his dissertations: *O pewnym odkształceniu powierzchni* [On certain deformation of surfaces], *Rozprawy Wydziału Matematyczno-Przyrodniczego Akademii Umiejętności w Krakowie* [Dissertations of the Mathematical-Natural of the Academy of Sciences in Cracow], no. 23 and *Acta Mathematica* no 16. Żorawski and Haskins used the methods of infinitesimally small transformations. Kazimierz Żorawski (Cracow) – *O pewnych badaniach z teorii form różniczkowych stopnia drugiego* [On certain studies of the theory of differential forms of second degree].

During the session of the Natural-Didactic Section Tadeusz Łopuszański – a teacher from Cracow was to present the paper entitled *O reformie nauczania nauk matematyczno-przyrodniczych w szkołach średnich* [On the reform of teaching mathematical-natural sciences in secondary schools]. However, it did not happen due to the speaker's absence.

World-famous physicist, professor Marian Smoluchowski also participated in the Convention and presented *Uwagi o kilku zjawiskach drobinowych związanych z przypadkowymi od stanu* [Remarks on a few corpuscular phenomena connected with coincidences from state].

In the convention Resolution, the participants postulated, among others, the necessity of increasing the number of lessons on natural subjects. The Resolution appeals so that the methods of teaching mathematics in a secondary school were changed and the institutions from the Polish Kingdom and Galicia made effort together in this respect.

XI Convention took place in Cracow on July 18th–22nd, 1911; a paper was presented, among others, by H. Steinhaus who had just obtained the doctoral degree in mathematical sciences in Göttingen. As Steinhaus mentioned, he had a long dispute with Zaremba concerning the axiom of completeness introduced into geometry by Hilbert. In this Convention, Sierpiński, Dickstein, Puzyna

and others were guests. Despite a lot of effort the author of the present book failed to find the Journal of the Convention of Naturalists and Physicians. Partial program is presented here on the basis of the information from *Kosmos*, *Wiadomości Matematyczne*, Steinhaus's memoirs, notes to *Słownik Biograficzny Matematyków Polskich* [Biographical Dictionary of Polish Mathematicians]. Edward Stamm – *Genetyczne ujęcie logiki* [Genetic approach to logic]. Antoni Łomnicki – *O pewnikach geometrycznych Hilberta w nauczaniu w szkołach średnich* [On Hilbert's geometrical axioms in secondary school teaching]. During the Convention, S. Dickstein presented a paper summarizing works over a new program¹²⁷. He listed factors influencing necessity of reforming teaching mathematics:

- progress in pedagogy and didactics based on research in educational psychology and experimental pedagogy;
- the character of modern mathematics being expresses in precision of reasoning and arguments as well as new framework for school mathematics, for example irrational numbers and operations;
- increasing period of applications;
- better adjustment of school education to requirements of life and culture;
- removal of the distinction between secondary and higher school.

Dickstein drew a lot of attention to the need of pupils' independence saying: *the value of teaching is not about the range and the extent of the programs but about the methods of lecture that will, at the same time, take into account the pupil's independence.*

Let us note that during the conventions representatives of scientific centers (Cracow, Lvov, Warsaw) had a chance to meet, talk and notice the scattered research in mathematics.

The philosophical, exact sciences, mineralogy, geology and zoological-anatomical-botanical, agricultural, pharmaceutical geography sections became engaged in teaching natural sciences in higher schools.

The Mathematical Section which formed during the Conventions of Naturalists and Physicians was also significant to a certain degree in the aspect of mathematical research. The very meeting and penetration of mathematical thought and culture were important, although the subject matter of research was different in every academic center. However, this did not hurt the mutual support among mathematicians from Lvov, Cracow, Warsaw. It is worth emphasizing that a profesor of the Jagiellonian University, and a member of the Academy of Skills, S. Zaremba, presented the results of W. Sierpiński.

¹²⁷ See Sprawozdanie z Posiedzeń Koła Matematyczno-Fizycznego [Report from Sessions of Mathematical-Physical Circle], addition to *Wiadomości Matematyczne* 1911.

Below we present information about that from the chronicles of *Kosmos* and publications of the Academy of Sciences (1911, 1912).

Czł. S. Zaremba przedstawia pracę prof. W. Sierpińskiego p. t.: *O rozkładzie płaszczyzny na dwie mnogości punktkształtne.*

W pracy tej autor podaje nowy, elementarny dowód twierdzenia p. Mazurkiewicza o rozkładzie kontynuów na dwie mnogości punktkształtne, zamieszczonego w styczniowym zeszycie Biuletynu Akademii za rok 1913. Dowód swój autor uzupełnia uwagą, że istnieje niezmiernie prosty rozkład płaszczyzny na trzy mnogości punktkształtne (mnożość wszystkich punktów spólrzednych niewymienionych i mnogość wszystkich pozostałych punktów płaszczyzny.

S. Zaremba presents the piece of work by professor W. Sierpiński entitled *O rozkładzie płaszczyzny na dwie mnogości punktkształtne* [On division of a plane into two point-shaped sets].

Or the work on the famous *Sierpiński's carpet*

Czł. S. Zaremba przedstawia pracę prof. W. Sierpińskiego p. t.: „*O pewnej nowej krzywej, wypełniającej kwadrat*“.

Autor podaje nowy, szczególnie prosty przykład na krzywą, która posiada własność, wymienioną w tytule pracy.

Janiszewski's work:

Czł. S. Zaremba przedstawia pracę p. Z. Janiszewskiego p. t.: *Uzasadnienie pewnej własności kontynuów nieprzywiedlnych, łączących dwa punkty.*

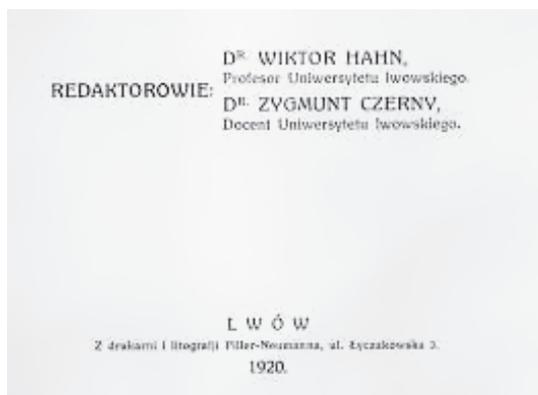
Autor podaje dowód twierdzenia następującego: Jeżeli oznaczymy przez AB jakiegokolwiek kontynuów nieprzywiedlne, łączące punkty A i B , tedy na kontynuów AB nie istnieje taki punkt M , ażeby można było połączyć ten punkt przez dwa nie zlewające się ze sobą, na kontynuów AB położone kontynua zarówno z punktem A jak i z punktem B .

Mathematicians' meetings during the Conventions of Polish Naturalists and Physicians allow one to notice cooperation among mathematicians from the three annexed territories. All centers significantly contributed to raising the rank and importance of mathematics in various types of schools, understanding the need for practicing it by the society.

4.5. Mathematical Society in Lvov

Scientific problems at meetings, members founders

As a result of searching for information on the Mathematical Society in Lvov I have found an inconspicuous publication entitled *Sprawozdanie Związku Polskich Towarzystw Naukowych* [Report of the Union of Polish Scientific Societies] edited by W. Hahn and Z Czerny.



Part of title page of *Sprawozdanie*

The Mathematical Society in Lvov was established in 1917 at the initiative of Lvov mathematicians J. Puzyna (1856–1919), Z. Janiszewski (1888–1920), H. Steinhaus (1887–1972), A. Łomnicki (1881–1941), P. Dziwinski (1851–1936), Z. Krygowski (1872–1955), T. Czeżowski (1889–1981). It started its activity on the 3rd of December 1917, the statute was approved on 18th April 1918 with a rescript of Regency no. L. XIII a. 30315/452. The aim of the Society was, among others, *to support scientific works in the scope of mathematics and related skills as well as to spread mathematical knowledge through scientific meetings (taking place mostly every two weeks), talks, contests, publications and gathering scientific means.*

The actions of the Polish-Bolshevik war disrupted the activity of the Society in the second half of 1920. As a result of a proposal by the Cracow Mathematical Society, the Lvov Mathematical Society ceased to exist and was re-established as the Lvov Branch of the Polish Mathematical Society. The Polish Mathematical Society in Cracow was then a central organization supervising branches in Warsaw and Lvov. The seat of the Society was Cracow and the Jagiellonian University professor, Stanislaw Zaremba served as the president and the secretary was Franciszek Leja.

Professor Józef Puzyna was the first president of the Mathematical Society in Lvov. The Board of the Association was comprised of professor Eustachy Zyliński (vice-president), professor Antoni Łomnicki (secretary) and doctor Stanisław Ruziewicz (treasurer). After Józef Puzyna's death in June, 1919, the presidency of the Society was taken over by doctor Marcin Ernst. The rest of the Board of the Association remained the same.

It is worth emphasizing the attitude towards the goals of the Society. Apart from the aim of propagating science it also took into account broadly understood popularization of mathematics. From the point of view of mathematical culture this attitude towards the Society's goal made it an open group. However, the Mathematical Society in Cracow described the aim of its activity as versatile cultivating of pure and applied mathematics, though the motion was denied to make popularization of mathematics the aim of the Society as well (see Domoradzki, Pelczar 2009).

Zebrańie Konstytuujące

110.0.0.0.1 Zebrańie Konstytuujące, odbyłoby się dniami 2. Kwietnia 1919. r. o godz. 5-tej wieczorem w lokalu Seminar. Głogosińskiego nr. in. Lwów 12

Obecni: Stefan Banach, Julian Łomnicki prof. gimn., Leon Chwistek prof. gimn., Stanisław Jędras prof. gimn., Dr A. Hoberster docent uniw., Dr F. Horzyński prof. gimn., adiunkt kancelii uniw., Dr F. Leja asystent uniw., Wł. Mikulajew prof. gimn., Dr A. Rosenblatt docent uniw., Antoni Ruziewicz prof. gimn., Dr J. Sleszyński prof. uniw., Kazimierz Stankiewicz, Dr A. Witk prof. gimn., Dr H. Zarumba prof. uniw., Dr K. Zorawski prof. uniw.

Zebrańie zaczął Dr K. Zorawski podnosząc, że w Warszawie ma powstać ogólnopolskie Tow. matematyczne, podobnie powstał uniwersal na reżimie, Tow. matemat. w Krakowie, które oczywiście może później wejść w skład Towarzystwa warszawskiego. Skierował jednak Tow. na uchwalono i zebrańie przewodniczącemu Zebrańie Konstyt. Dr H. Zarumbę.

Onewodniemy podjęto wamy w wyborze raportu Dr A. Hobersteja do dyskusji protokołu i wcielił: głośno referował: Dr F. Leja dla adyutanta projektu Statutu regulaminu Towarzystwa. Nad adyutantym projektem zaczęła się długa dyskusja, do której głośno oświadczenia celu Tow. przyznawania promocyjnych tytułów, oraz umiędowienia hipotez i twierdzeń, uzbudzenia precesu Tow. Cel Tow. oświadczo jako uzbudzenia uzbudzenia matematyki, czyli i stosowania; przy czym upodł uniw. aby usunąć, że celem Tow. jest również popularny rozwój matematyki. Po uzbudzeniu poprawek i poprawek głośno przez prof. Zarumbę, przyjęto Statut i brzmienia podanyemu przez referenta, a następnie regulamin, kierując się wskazaniami i twierdzeniami i twierdzeniami uzbudzenia.

Jako zapisowa została uchwalono 10K, a jako paruz ete ad.

The first page of the official record of the constituting meeting of the Mathematical Society in Cracow (secretary F. Leja).

The problems discussed at the meetings of the Mathematical Society in Lvov are presented in chapter VI and treated as a special case in this piece of work. Below we shall present the founders of the Mathematical Society in Lvov with emphasis on the roles they played at that time in Lvov.

Józef Puzyna, Knyaz (Prince) on Kozielsk (1856–1919), graduated from mathematical studies at the Lvov University in 1882, in 1883 obtained doctorate at the Lvov University. In years 1883–1885 he studied mathematics in Berlin and was taught by, among others, C. Weierstrass, L. Kronecker and L. Fuchs. In 1885 he obtained a *habilitation degree* at the Lvov University, he occupied the position of docent in 1885–1889, of an associate professor in 1889–1892, of ordinary professor in 1889–1919. He directed the Institute of Mathematics since 1892 until his death in 1919. In 1904–1905 he was the rector of the Lvov University. He was a member of the examination Committee for candidates for gymnasias and real schools.

Zygmunt Janiszewski (1888–1920) was born in Warsaw, he passed his maturity examination in I Real School in Lvov. Maturity examination in a real school entitled to continue studies at a polytechnic in the area of the Austrian-Hungarian Monarchy. He studied abroad in the winter semester 1907/08 at the Polytechnic in Zurich, then he continued university studies in Göttingen (1908, summer semester), in Paris (academic year 1908/09), in Munich (1909/10, winter semester), in Göttingen (summer semester 1910), in Paris (academic year 1910/11), in Strasbourg (1912, summer semester), in Graz (1913, summer semester). He received a doctorate on the basis of a dissertation entitled *Sur les continus irréductibles entre deux points* at the Paris University. He applied for recognition of his diploma in Lvov for the first time in 1914 (the application was lost), for the second time we find the application for recognition in June 1916 and the final one from 1917. Before his arrival to Lvov in the academic year 1911/12 he gave lectures at Towarzystwo Kursów Naukowych [the Society of Scientific Courses], an ersatz of a Polish university in Warsaw (at that time in Warsaw a tsar's university and polytechnic operated) on the following subjects: *Analisis situs* and *Filozofia matematyki* [Philosophy of mathematics]. He received the *habilitation degree* in 1913 at the Lvov University on the basis of a dissertation entitled *O rozcinianiu płaszczyzny przez continua* [On cutting a plane by continua] in Lvov. He received the right to lecture, in Lvov he lectured *Teoria funkcji analitycznych, Rachunek funkcyjny* [Theory of analytical functions, Function calculus] (1914). On the example of Z. Janiszewski one may notice the influence of political events of the life of an individual. On the 30th of August, 1914, Z. Janiszewski joined the Polish Legions (he did not receive salary then). According to documents in his personal file¹²⁸ c. k. Regency in Biała inquired

¹²⁸ District Archives, Lvov.

if Janiszewski had already returned from the Legions and if he had taken up his job. The Philosophical Faculty asked the rector of the Lvov University that in October 1916 he should recall Janiszewski, a sergeant of the Legion, for the academic year 1916/17 so that he could give lectures in place of the interneer Waław Sierpiński. At the time when Sierpiński and Janiszewski were unable to give lectures, the only remaining lecturer was J. Puzyna and only one seminar functioned. In the Legions Janiszewski refused to vow his loyalty to the Austrian government. In the personal file we also find his appointment to the post of an assistant for years 1917–1919 with an application to c.k. Regency in Lvov with a request to approve of this application by the Ministry of Religions and Education in Vienna as well as to allocate funds for his salary. In 1918 he accepted professor's responsibilities at the Warsaw University. He is the author of *O potrzebach matematyki w Polsce* [On the needs of mathematics in Poland], where he formulated the idea of creating a mathematical school.

Hugo Dyonizy Steinhaus (1887–1972) was born in Jasło. He received his maturity certificate in 1905 in gymnasium in Jasło. In 1905–1906 he studied mathematics in Lvov, in 1906–1911 in Göttingen. He participated in lectures of, among others, Hilbert and Klein. In 1911 here received there doctorate degree on the basis of his dissertation entitled *Neue Anwendungen des Dirichlet'schen Prinzips*. In 1915 he participated in the war operation, he was a gunner of the 1st Regiment of Artillery of the Polish Legions. In the following year he accepted a job in *Centrala Odbudowy Kraju* [The Center for Reconstruction of Poland] in Cracow. As it was mentioned by R. Duda, J. Puzyna noticed a self-employed scientist in Cracow and brought him to Lvov. In 1917 he received *doktor habilitowany* degree (habilitation) in Lvov on the basis of his dissertation *O niektórych własnościach szeregów Fouriera* [On certain properties of the Fourier's series]. He obtained the right to lecture and was employed at the c.k. University in the position of an assistant. A year before he “discovered” Stefan Banach in Cracow (see Duda 2009). In 1919 he published a piece of work entitled *Additive und stetige Funktionaloperationen*,¹²⁹ viewed as the first work of a Polish mathematician in a new field of mathematics called functional analysis. In 1920 he became an associate professor of mathematics at the Jan Kazimierz University in Lvov and the head of the Institute of Mathematics, and in 1923 he received the title of ordinary professor. In 1929 together with Stefan Banach he founded the journal *Studia Mathematica*. Since 1945 he was in Wrocław.

¹²⁹ *Mathematische Zeitschrift* 5(1919), pp. 186–221.

Imię i nazwisko: Hugo Ignacy dr. in. Steinhaus.

Urodzony dnia 14 stycznia 1887 w Jasle.

Obbyte studia: po ukończeniu s.b. gimnazjum w Jasle studia z zakresu filozofii i matematyki na uniwersytecie lwowskim w r. 1905/6, potem z matematyki na uniwersytecie getyngińskim (1906-1911), winaubajskim (1911) i paryskim (1912)

Doktor fil. uniwersytetu getyngińskiego
 promowany dnia 10 maja 1911. w Getyndze
 ewentualna nostryfikacja 7 sierpnia 1917 przez Uniwersytet Lwowski za równoleżnikowość z c.k. Uem. Wyższ. Szkołą z 7 lipca 1917 l. 20.466.

Habilitowany z matematyki
 na filozoficznym Fakultacie Uniwersytetu we Lwowie
 Zatwierdzony Rozp. M. W. i O. z 7 lipca 1917 l. 20.466.

11


 Ministerium
 des Kultus und Schulwesens
 Wien, am 7. Juli 1917.

Z. 20.466.

Habilitatio des Dr. Hugo S t e i n h a u s für
 Mathematik.
 z. Z. 484 vom 13. März 1917.

ii

Der Dekan der philosophischen Fakultät
 der k. k. Universität

iii
 L e m b e r g.

Ich erteile dem Beschlusse des Professoren-Kollegiums der philosophischen Fakultät der k. k. Universität in Lemberg auf Zulassung des Dr. Hugo S t e i n h a u s als Privatdozenten für Mathematik an der gesamten Fakultät unter gleichzeitiger ausnahmsweiser Genehmigung des Beschlusses des Professoren-Kollegiums auf Nostrifikation des an der Universität in G e t t i n g e n erworbenen philosophischen Doktordiploms des Genannten die Bestätigung.

Die Beilagen des Berichtes folgen im Anschlusse mit Ausnahme des curriculum vitae und des Vorleseprogrammes mit der Aufforderung zurück, die Personalanlagentabelle ebentens anher vorzulegen.

Der Leiter des Ministeriums für Kultus und Unterricht :

E. W. ...

Wydział filozoficzny
 Pod: 21/7 1917
1. 10. 1917

District Archive in Lvov, Personal file of H. Steinhaus, materials from the *privatdozent's* activity report and recognition of doctoral diploma.

Antoni Łomnicki (1881–1941) – since his birth, he has been always connected with Lvov. He was born in January 17th, 1881, He finished IV gymnasium in Lvov, studied mathematics on the Philosophy Faculty of the Lvov University. In 1903 he achieved the degree of the philosophy doctor on the basis of a dissertation: *O odwzorowaniach cząsteczek funkcji hypergeometrycznych* [On hypergeometric functions particles' mappings]. In the years 1903–1919 he was a teacher in gymnasia in Lvov and Tarnow. Thanks to a scholarship from the ministry, he continued his studies in Gottingen (1906–1907). He attended the lectures of H. Minkowski, D. Hilbert, F. Klein and G. Herglotz (1881–1953). In the academic year 1913–1914 he was lecturing as a privatdozent on the Polytechnic School in Lvov on the Machine Construction Faculty, where in 1919 he got the right to conduct lectures. He also got the title of a docent and then became the professor of mathematics, just after professor Zdzisław Krygowski. In 1920 he was appointed an associate professor of mathematics in the Lvov Polytechnic and became the head of the Mathematics Faculty (more about him in Chapter III).

Placyd Zasław Dziwiński (1851–1936) graduated from the gymnasium in Tarnopol. He studied mathematics at the Philosophical Faculty in Lvov University and at the same time at the Faculty of Engineering at the Technical Academy in Lvov. He graduated in 1874. Since 1874 he had been an assistant at the I Department of Mathematics at the Technical Academy. Then he completed one year studies in Berlin and Paris. He was the founder of a meteorological station in Jarosław. In 1881 he received his Ph.D. and in 1886 he obtained his *habilitation* degree in mathematics at the Polytechnic School in Lvov. In 1887 he was appointed an associate professor of the II Department of Mathematics. After two years he became an ordinary professor. He lectured in mathematics and spherical astronomy. In 1898 he took over the First Department of Mathematics and continued to be its head until retirement (1925). He still lectured during his retirement. He received the title of an honorary professor of the Lvov Polytechnic with the right to lecture. He was the dean of the Faculty of Machine Construction (1888–1889) and the Faculty of Technical Chemistry (1891–1892), the rector of the Polytechnic School (1893–1894). In 1889–1894 he edited *Czasopismo Techniczne* [Technical Journal]. Since 1899 he was one of the members of the City Council of Lvov. He published among others: *Powierzchnię falową Fresnela ze stanowiska geometrycznego* (1878) [Fresnel's wave surface from the point of view of geometry], *Przyczynek do teorii stożków stycznych do powierzchni stopnia drugiego* (1885) [Contribution to theory of cones tangent to second degree surfaces]. He was the author of the textbook *Zasady algebry dla wyższych klas gimnazjalnych* (1891) [Principles of algebra for higher classes of gymnasia]. The most important piece of work by professor Dziwiński is *Wykłady matematyki* [Lectures in mathematics] (1902–1908). He died on July 13th, 1936 in Lvov.

Zdzisław Jan Antoni Krygowski (1872–1955) was born in Lvov, attended gymnasia in Wadowice and Cracow; completed his studies, teacher's license exam and doctorate at the Jagiellonian University in Cracow, he had a grant in Berlin in academic year 1895/96, he worked under the guidance of L.T. Fuchs and A. H. Schwarz, in 1896–1898 he was in Paris and worked under the guidance of such mathematicians as P. Appell and E. Picard. After his return he worked as a teacher, initially in Cracow, then in Przemyśl. In 1901 he became a docent of higher mathematics in the Polytechnic School in Lvov and at the same time he lectured on mathematics and physics in the Higher Real School in Lvov. He received his doktor habilitowany degree at the Lvov University in 1908 on the basis of the dissertation *Sur le développement des fonctions hyperelliptiques en séries trigonométriques*. In 1908 he became an associate professor and in 1909 ordinary professor of mathematics in the Polytechnic School in Lvov where he was the rector in 1917–1918. In 1919 he moved to Poznań. At the Poznań University it was he who suggested three young students Marian Rejewski, Zygmunt Zygański and Jerzy Różycki for Biuro Szyfrów Wojska Polskiego [Code Office of Polish Army]. Those three mathematicians deciphered the famous German ciphering machine called *Enigma*. Thus, the Lvov's holistic approach to mathematics, through Professor Z. Krygowski, had its impact on the end of World War II, but this is a different story.

Tadeusz Czeżowski (1889–1981), philosopher, logician, organizer of scientific life attended the seminar in Lvov supervised by K. Twardowski. Since 1919 in Vilnius, since 1923 professor. After the war he came to Toruń where he started work at the Nicolaus Copernicus University. He was of the opinion that philosophy should be directed towards the utmost total areas of experience and that it can be practiced sensibly only if it is practiced scientifically.¹³⁰ Tadeusz Czeżowski was one of the closest disciples of Kazimierz Twardowski and an unappreciated figure of the Lvov-Warsaw school. It is worth emphasizing, as S. Zamecki¹³¹ did, that Czeżowski published, among others, *Teoria klas* [Theory of classes], which is devoted especially to the problems of antinomy connected with the theory of classes and the distinction between theory of classes and the set theory.

4.6. Periodicals

In order to become familiar with the problems of periodicals in Poland we shall present a list of XIX century periodicals in which mathematical works and articles on mathematics in Polish were published.

¹³⁰ See J. Chojnacki, T. Czeżowski, *Wielka Encyklopedia Powszechna* [Great Common Encyclopedia], PWN, vol. 6, p. 400.

¹³¹ S. Zamecki, *Koncepcja nauki w Szkole Lwowsko-Warszawskiej* [The concept of science in Lvov-Warsaw School], Monografie z Dziejów Nauki i Techniki, Ossolineum, 1977.

This list does not aspire to be complete, however it was elaborated for quite a long time. With these resources we enter the 20th century. It is interesting that Lvov did not have long publishing traditions particularly in establishing periodicals etc. The titles written in bold appeared in Lvov.

The periodical titles were checked in *Bibliografia czasopism XIX wieku, t. III, litera C*¹³² [Bibliography of periodicals of the 19th century, vol. III letter C] by Karol Estreicher, also *Bibliografia piśmiennictwa polskiego z działu matematyki i fizyki oraz ich zastosowań* [Bibliography of Polish output in mathematics and physics with its application] by Teofil Żebrawski¹³³ was very helpful.

Żebrawski's *Bibliography* comprises a list of, among others, mathematical works since the first one in the history of Poland until 1830. This date is not a turning point. Żebrawski's work was published on the occasion of the 400th birthday of Nicolas Copernicus. Although the author in his preface stipulates that he did not want to omit any, even the smallest, piece of work, the bibliography is not at all complete¹³⁴. It is confirmed by, among others, *Zeszyt próbny Bibliografii matematycznej polskiej XIX. Stulecia* [Polish mathematical bibliography of 19th century – trial issue] by S. Dickstein and E. Wawrykiewicz (Cracow 1894). It is a pity that the idea for their publication was not brought to life. Moreover, Żebrawski decided to put works by foreign authors (not translations) on his list, those which were used in lectures in academic colleges or were popular in Poland for other reasons. It may lead to misleading judgements about Poland.

1. Ateneum, Pismo naukowe i literackie, miesięcznik, Warsaw 1876–1901 [Monthly periodical on science and literature];
2. Biblioteka Warszawska, pismo poświęcone naukom, sztukom i przemysłowi [Periodical devoted to sciences, arts and industry], Warsaw 1841–1914;
3. Bulletin International de l'Académie des Sciences de Cracovie, Cracow 1889–1952.
4. Cirkular po Uprawnieniju Warszawskim Uczebnym Okrugom [A circular concerning the management of Warsaw Science Area, a journal in Russian] monthly periodical, Warsaw, 1869–1900.

¹³² Second edition Cracow, 1962.

¹³³ Cracow 1873, edition of the owner of Kórnik Library, the president of the Exact Sciences Society in Paris.

¹³⁴ E.g. the periodical *Ćwiczenia Naukowe, dział matematyczno-fizyczny* [Scientific Exercises, mathematical-physical branch], volume I and II, Warsaw, 1818, editor Franciszek Skomorowski, is not included.

It also lacks certain works from *Sprawozdania Szkolne* [School Reports], e.g.

Wojciech Chęćewski, *Krótką historia matematyki czystej do końca wieku XV* [Brief history of pure mathematics until the end of XV century], *Sprawozdanie Szkoły Wojewódzkiej w Lublinie za r. szk. 1829/30* [Report of the Voivodship School in Lublin for the school year 1829/30].

Józef Kalasanty Janicki – *O kwadratach magicznych* [On magical squares], *Sprawozdanie Szkoły Wojewódzkiej Pijarów* [Report of the Piarists' Voivodship School], Warsaw, 1830.

5. Ćwiczenia Naukowe. Oddział Matematyczno-Fizyczny (Scientific Exercises. Mathematical-Physical Branch], Warsaw 1818 (continued as Pamiętnik Naukowy, Warsaw 1819);
6. **Czasopismo Akademickie** [**Academic Journal**], monthly periodical, Lvov, 1895–1898;
7. Czasopismo Techniczne [Technical Journal], monthly periodical, Cracow 1880–1882;
8. **Czasopismo Techniczne** [**Technical Journal**], an organ of Towarzystwo Politechniczne [the Polytechnic Society] in Lvov and Krakowskie Towarzystwo Techniczne [the Cracow Technical Society], monthly periodical, later twice a month, Lvov 1883–1939;
9. Czasopismo Towarzystwa Technicznego Krakowskiego [Journal of the Cracow Tehcnical Society], (initially beweekly, later a monthly periodical), Cracow 1890–1899, (before as Czasopismo Techniczne [Technical Journal]), Cracow, 1880–1882;
10. **Czasopismo Towarzystwa Technicznego we Lwowie** [**Journal of the Technical Society in Lvov**], Lvov 1874–1880;
11. Dziennik Politechniczny [Politechnical Journal], Warsaw, 1860–1862;
12. **Dziennik I–IX Zjazdu Lekarzy i Przyrodników Polskich** [**Journal of I–IX Conventions of Polish Naturalists and Physicians**], Lvov, Poznań, Cracow, 1869–1911;
13. Echo, daily paper, Warsaw 1877–1883;
14. Ekonomista [The Economist], Weekly economic, financial and statistical review, Warsaw 1878–1883;
15. Gazeta Techniczna [Technical Newspaper], 1898–1899;
16. Izwiestija Warszawskaja Uniwersitetskaja [University of Warsaw's News, a Russian journal] Warsaw, 1870–1914;
17. Kłosa, weekly illustrated magazine, Warsaw 1865–1890, separate quarterly Kłosa, Warsaw 1865–1890;
18. Księga Wynalazków [A Book of Inventions]. Addendum to the weekly magazine Przyroda i Przemysł [Nature and Industry], Warsaw, 1872;
19. **Muzeum** [**Museum**], periodical of the Society of Secondary and Higher School Teachers, Lvov 1885–1918;
20. Niwa, biweekly (since 1895 scientific, literary and artistic weekly), (since 1898 Niwa Polska), Warsaw, 1872–1905;
21. Ognisko domowe¹³⁵, weekly devoted to affairs of family life, physical and mental education, culture and mentality, Warsaw 1873, continuation in 1874–1876;

¹³⁵ Popular articles were published by e.g. Feliks Beneveni (1833–1879), author of handbooks, teacher of gymnasium in Warsaw.

22. Pamiętnik Akademii Umiejętności w Krakowie, Wydz. Matematyczno-Przyrodniczy [Journal of Academy of Learning in Cracow, Mathematical-Natural Faculty], Cracow, 1874–1890;
23. Pamiętnik Fizjograficzny [Physiographic Journal], Warsaw, 1881–1918;
24. Pamiętnik (powszechny) Nauk i Umiejętności [Journal of Sciences and Skills], monthly, Cracow 1835;
25. Dziennik Wileński [Vilnius Journal], monthly, Vilnius, 1805–1806, 1815–1830;
26. Pamiętnik Naukowy [Scientific Journal], monthly, Cracow, 1837–1838;
27. Pamiętnik Naukowy [Scientific Journal], (as a continuation of Scientific Exercises), Warsaw, 1819;
28. Pamiętnik Naukowy [Scientific Journal], Warsaw 1866;
29. Pamiętnik Polski [Polish Journal], journal devoted to history, sciences, literature, Paris, 1838 (continuation of Weekly Magazine of Polish Emigration);
30. Pamiętnik Towarzystwa Nauk Ścisłych w Paryżu [Journal of the Society of Exact Sciences in Paris], 1871–1882, Paris;
31. **Pamiętnik Towarzystwa Politechnicznego we Lwowie [Journal of Polytechnic Society in Lvov]**, addendum to Technical Journal, Lvov, 1897;
32. Pamiętnik Fizycznych, Matematycznych i Statystycznych Umiejętności z Zastosowaniem do Przemysłu [Journal of Physical, Mathematical and Statistical Skills with Application in Industry] Warsaw, 1830 (formed from Pamiętnik Warszawski Umiejętności Czystych i Stosowanych);
33. Pamiętnik Sandomierski [Sandomierz Journal], quarterly devoted to Polish history and literature, Warsaw 1829–1830;
34. Pamiętnik Warszawski [Warsaw Journal], monthly, 1815–1821 (or journal of sciences and skills);
35. Pamiętnik Warszawski Umiejętności Czystych i Stosowanych [Warsaw Journal of Pure and Applied Skills], Warsaw, 1829;
36. Pamiętniki Umysłowe [Mental Journals], Vilnius 1845–1846;
37. Piśmiennictwo Naukowe Polskie z Dziedziny Nauk Matematycznych i Przyrodniczych [Polish Scientific Writings in the Field of Mathematical and Natural Sciences], Warsaw 1882–1884;
38. Półrocznik Towarzystwa Naukowego Akademickiego w Berlinie oraz Towarzystwa Naukowego Politechnicznego Polaków w Dreźnie [Semi-annual of the Academic Scientific Society in Berlin and the Scientific Polytechnic Society of Poles in Dresden], Poznań, 1876–1877;
39. Prawda, political, social and literary weekly periodical, Warsaw 1881–1915;
40. Prace Matematyczno-Fizyczne [Mathematical-Physical Works], Warsaw, 1888–1918 and later;
41. Przegląd Akademicki [Academic Review], Cracow, 1881–1883;
42. Przegląd Akademicki [Academic Review], monthly, Cracow, 1890;
43. Przegląd Pedagogiczny [Pedagogical Review], Warsaw, 1882–1939;

44. Przegląd Tygodniowy Życia Społecznego, Literatury i Sztuk Pięknych [Weekly Review of Social Life, Literature and Fine Arts], Warsaw 1866–1905, in years 1880–1903 with monthly addendum, (in the monthly addendum to this magazine one may find articles with mathematical content)¹³⁶;
45. Przyroda i Przemysł [Nature and Industry], weekly, Warsaw, 1872–1881¹³⁷;
46. Rocznik Akademii Umiejętności w Krakowie [Annual of the Academy of Skills in Cracow], 1891–1918;
47. Rocznik Kółka Naukowego Tarnopolskiego [Annual of the Tarnopol Scientific Circle], 1892–1895;
48. Rocznik Odkryć i Wynalazków, Poznańskie Towarzystwo Przyjaciół Nauk [Annual of Discoveries and Inventions, Poznań Society of Friends of Science], 1872–1874;
49. Rocznik Pedagogiczny [Pedagogical Annual], Warsaw, 1881–1883;
50. Rocznik Zbiorowy Prac – Naukowych [Collective Annual of Scientific Works], Warsaw, 1879–1881;
51. Rocznik Towarzystwa Naukowego z Uniwersytetem Krakowskim Połączonym [Annual of the Scientific Society connected with the Cracow University], (since 1857 c.k. Annual), 1817–1872;
52. Rocznik Warszawski [Warsaw Annual], Warsaw, 1823;
53. Roczniki Towarzystwa Naukowego w Toruniu [Annals of the Toruń Scientific Society], 1878–1918;
54. Roczniki Towarzystwa Przyjaciół Nauk Poznańskiego [Annals of the Poznań Society of Science Friends], 1860–1918;
55. Roczniki Towarzystwa Warszawskiego Przyjaciół Nauk [Annals of the Warsaw Society of Science Friends], Warsaw, 1802–1830;
56. Rozprawy Akademii Umiejętności Wydziału Matematyczno-Przyrodniczego [Dissertations of the Academy of Skills the Mathematical-Natural Faculty], Cracow, 1891–1918 and later;
57. Rozprawy i Sprawozdania z Posiedzeń Wydziału Matematyczno-Przyrodniczego Akademii Umiejętności [Dissertations and Reports from Meetings of the Mathematical-Natural Faculty of the Academy of Skills], 1874–1890;
58. Sprawozdania z Posiedzeń Akademii Umiejętności w Krakowie (Report on Academy of Skills Meetings in Cracow), 1890–1918;

¹³⁶ In 1892, in vol. II, there appeared a wonderful article by H. Poincaré *Geometria nieeuclidowska* [Non-Euclidean geometry]. The translator did not make himself known. There are serious editorial mistakes, e.g. instead of four-dimensional geometry we find fourth geometry, instead of surface of triangle we have surface of angle etc. However, this work is exceptionally original.

¹³⁷ This magazine was founded and edited by Karol Hertz (1843–1904) – master of mathematics of Szkoła Główna and doctorate at the Halle University. He published in *Pamiętnik Towarzystwa Nauk Ścisłych w Paryżu: Teoria liczb złożonych i ich funkcji* [Theory of complex numbers and their functions], vol. VII, 1875, pp. 1–60; *O funkcjach nie mających pochodnych* [On functions without derivatives], vol. XI, 1879, pp. 1–24.

59. Sprawozdanie z Piśmiennictwa Naukowego Polskiego w dziedzinie Nauk matematycznych i przyrodniczych [Report on Polish Scientific Written Output in the field of Mathematical and Natural Sciences], Warsaw, 1882–1897;
60. *Sylwan*, journal of forestry and hunting, Warsaw, 1820–1858¹³⁸
61. Szkoła Polska [Polish School], Poznań 1849–1853;
62. **Tygodnik Naukowy** [**Scientific Weekly**], Lvov, 1865;
63. Wiadomości Matematyczne [Mathematical News], Warsaw, 1897–1918;
64. Wizerunki i Rozstrząsania Naukowe [Scientific Images and Considerations], Vilnius 1834–1843;
65. *Wszechświat* [Universe], popular weekly devoted to natural sciences, Warsaw, 1882–1918 and later;
66. *Zdrowie* [Health], popular-scientific biweekly devoted to natural sciences and hygiene, Warsaw, 1878.

Let us once more cite a few general scientific periodicals, which appeared in Lvov and in which we may find articles connected with mathematics. It is not impressive in quantity. In this respect what Lvov thought was the following: we publish results in eminent periodicals either in our country or abroad. In Lvov we deal with organizing education at the level of secondary and higher school, we publish in periodicals of local scientific societies.

1. *Czasopismo Akademickie* [Academic Journal, monthly periodical], Lvov, 1895–1898;
2. *Czasopismo Techniczne* [Technical Journal, organ of Towarzystwo Politechniczne (the Polytechnic Society) in Lvov and Krakowskie Towarzystwo Techniczne (the Cracow Technical Society)], monthly periodical, later bimonthly, Lvov 1883–1939;
3. *Czasopismo Towarzystwa Technicznego we Lwowie* [Journal of the Technical Society in Lvov], Lvov 1874–1880;

¹³⁸ In *Sylwan*, tools for measuring plane figures called planimeters (also in *Pamiętnik Warszawski* and *Dziennik Politechniczny* were described in a detailed way e.g. 1. Description of composition and use of planimeter, a new measuring tool for planes invented by P. J. Colberga, Pr. zw. Geodezyi w Uniwersytecie Królewskim Warszawskim, vol. II, pp. 340–354;

2. The way of estimating planar areas without the use of calculus with a newly invented tool called Planimeter or with Tables made for this purpose. For the use of practicing geometers by Juliusz Colberg D. Fil. Professor of Measurement at the Warsaw University, Member of the Society of Science Friends with preface by P. Gruson D. Fil., Professor of Mathematics at the Royal University in Berlin, Member of the Berlin Academy of Skills etc. with 5 Tables, Warsaw, Drukarnia Jego Królewskiej Mości Rządowej, p. 58. Gruson's preface is the following:

Instrumental arithmetic has been enriched with the newly invented Planimeter. A skillful use of it will make preparation of maps easier and will add more confidence to it than an ordinary way of calculating did. I do not doubt that the inventor deserves gratitude for announcing this instrument.

4. Dziennik I–IX Zjazdu Lekarzy i Przyrodników Polskich [Journal of I–IX Conventions of Polish Naturalists and Physicians], Lvov, Poznań, Cracow, 1869–1911;
5. Kosmos [Cosmos], periodical of the (Polish) Association of Naturalists named after Copernicus in Lvov.
6. Muzeum [Museum], periodical of the Society of Secondary and Higher School Teachers, Lvov 1885–1918 and later;
7. Pamiętnik Towarzystwa Politechnicznego we Lwowie [Journal of Polytechnic Society in Lvov], addition to Technical Journal, Lvov, 1897;
8. Tygodnik Naukowy [Scientific Weekly], Lvov, 1865;

Mathematical works in Lvov school reports are presented in Chapter III, which emphasized the role of teachers in shaping mathematical culture in Lvov during the period of autonomy.

Bibliographical data concerning articles connected with mathematics published in Muzeum are presented in the Appendices as well as in other chapters of this dissertation, in particular in Chapter II some of the works have been discussed. It is worth emphasizing that the works in Muzeum were written by academic professors and teachers. This beautiful symbiosis was concentrated around words recalled by R. Jamrógiewicz: we serve an honest cause and as much as one can let each help the common good. I stress that teaching mathematics was common good. It is not the time to analyze the didactics of articles from Muzeum but it is worth noticing that Polish education in mathematics did not have the continuation of its ideas after World War II.

Problems of mathematical works in Kosmos are discussed in chapter VI.

4.7. Gymnasium textbooks

In chapter I we discuss programs in c.k. Gymnasium named after Franz Josef in Lvov, below we present a list of textbooks for gymnasium of the real type. This list will concern forms I and VIII (the first and the last one). Let us notice that the majority of used textbooks were published in Lvov. Not only teachers published them but also professors of schools of higher education, and not only from Galicia. In time there were less and less paraphrases of foreign works, the authors used domestic ideas. One may see here a cooperation between Cracow and Lvov.

In 1876–1918 in c.k. Gymnasium named by Francis Joseph in Lvov used the following maths textbooks¹³⁹,

¹³⁹ A. Meissner, J. Dybiec, *Bibliografia dziejów oświaty i wychowania w Galicji 1772–1918*, cz. II Źródła drukowane [Bibliography of the history of education in Galicia 1772–1918, part II Printed sources], Rzeszów 2007 and *Sprawozdania szkolne gimnazjów* [School reports of gymnasia] were used.

Form I

Edmund Bączalski, *Arytmetyka dla użytku niższych klas gimnazyjnych podług 26-go wydania dr Františka Močnika* [Arithmetic for lower classes of gymnasium according to the 26th edition of F. Močnik], Lvov 1874, pp. 263.

Grzegorz Grzybowski, *Arytmetyka, dla użytku niższych klas gimnazjalnych, podług 19-go do metrycznych miar zastosowanego wydania dra Fr. Močnika arytmetyki dla niższych klas gimnazjalnych opracowana* [Arithmetic for lower classes of gymnasium ... with metric measure] Lvov 1875, pp. 96.

Edmund Bączalski, Grzegorz Grzybowski, *Arytmetyka do użytku szkół niższych realnych, wydziałowych, handlowych, przemysłowych, rolniczych i innych podobnych zakładów naukowych, ułożona z uwzględnieniem miar metrycznych w myśl nowego planu dla szkół realnych z r. 1872* [Arithmetic for lower real school and others with metric measure according to a new curriculum from 1872].

František Močnik, *Arytmetyka dla użytku c.k. niższego gimnazjum. Na I klasę*, [Arithmetic for lower gymnasium], Lvov, 1864, translated by S. Krawczykiewicz, pp. 132.

František Močnik, *Geometrya poglądowa dla klas niższych szkół średnich* [Visual Geometry for lower classes of secondary schools], translated by Grzegorz Maryniak. Cz. I na kl. I i II, 5th edition according to 21st German edition, Lvov, 1886, pp. 85. The next 6 editions took place until 1906.

František Močnik, *Początki geometrii sposobem uzmysławiającym wyłożone, według siódmego wydania niemieckiego* [The beginnings of Geometry presented visually according to the 7th edition], translated by T. Sternal. Oddział I, Lvov 1867, pp. 100, 153 wood engravings in text.

Władysław Zajaczkowski, *Początki arytmetyki do użytku szkół średnich, cz. I na klasę I i II* [The beginnings of Arithmetic for secondary schools], Lvov, 1887, pp. 135.

František Močnik, *Geometrya poglądowa dla klas niższych szkół średnich*, przełożył Grzegorz Maryniak, cz. I na klasy I i II [Visual Geometry for lower classes of secondary schools], translated by Grzegorz Maryniak], 1886, pp. 85.

Władysław Zajaczkowski, *Początki arytmetyki do użytku szkół średnich, cz. I na klasę I i II* [The beginnings of Arithmetic for secondary schools], Lvov, 1887, pp. 135.

Józef Soleski, Julian Fąfara, *Arytmetyka na I i II klasę szkół średnich* [Arithmetic for I and II classes of secondary schools], Lvov, 1894, pp. 100.

Mieczysław Jamrógiewicz, *Geometrya poglądowa dla użytku w klasach niższych szkół gimnazjalnych i realnych* [Visual Geometry for lower classes of classical and real gymnasiums], Lvov, 1884, modified edition 1897, pp. 172, last 5th edition, 1901.

Ignacy Kranz, *Arytmetyka i algebra. Podręcznik dla niższych klas szkół średnich*, cz. I na klasę 1 i 2, [Arithmetic and Algebra. Textbook for lower classes of secondary schools], Cracow, 1904, pp. 165.

František Močnik, *Geometrya poglądowa dla klas niższych szkół średnich*, cz. I na klasy I i II [Visual Geometry for lower classes of secondary school, part I for I and II classes], from year to year there were successive editions, the 6th in 1906 in Lvov, containing 117 pages and 95 illustrations.

Wincenty Frank, *Arytmetyka dla klasy I i II* [Arithmetic for I and II classes], Lvov, 1912.

Ignacy Kranz, *Geometrya poglądowa*. Podręcznik na klasę I gimnazjów, realnych gimnazjów i szkół realnych [Visual Geometry. Textbook for I classe of gymnasium, real gymnasium and real schools], 2nd edition, Cracow 1912, pp.62.

Mieczysław Jamrógiewicz, *Geometrya poglądowa dla użytku w klasach niższych szkół gimnazjalnych i realnych* [Visual Geometry for lower classes of gymnasium and real gymnasium], Lvov, 5th edition, 1901, pp. 172.

Ignacy Kranz, *Geometrya poglądowa*. Podręcznik dla niższych klas szkół średnich. Cz. I na klasę 1 i 2, [Visual Geometry. Textbook for lower classes of secondary schools], Cracow, 1907, pp. 77.

František Močnik, *Geometrya dla klas wyższych gimnazjalnych z ósmego wydania niemieckiego przełożył i uzupełnił dr Tomasz Stanecki* [Geometry for higher classes, 8th edition translated and completed by dr Tomasz Stanecki], Lvov, 1867, VII and 365, 2nd edition, Lvov, 1880, 4th edition according to 22nd German edition, Lvov 1895 (print in Cieszyn, 227 wood engravings in text).

František Močnik, *Geometrya poglądowa dla szkół średnich*, przełożył Grzegorz Maryniak, wyd 5 [Visual Geometry for secondary schools, translated by Grzegorz Maryniak, edition no. 5], Lvov, 1903, wyd. 6, Lvov, 1906, 328 pp. + VII.

Placyd Dziwiński, *Zasady algebry dla wyższych klas gimnazjów i szkół realnych* [The rule of Algebra for higher classes of gymnasiums and real schools], Lvov, 1898, 3rd edition as *Podręcznik arytmetyki i algebry dla wyższych klas szkół średnich* [Textbook of Arithmetic for higher classes of secondary schools], 3rd modified edition of *Zasad algebry* approved by Wysoka Rada Szkolna Krajowa [High Domestic School Council] on 15th December 1906, Lvov 1907, XVI + 448 pp., 4th edition, *Podręcznik arytmetyki i algebry dla średniego i wyższego stopnia nauki w gimnazjach i szkołach realnych przystosowane do nowych planów nauki w szkołach średnich* [Textbook of Arithmetic and Algebra for medium and higher level in gymnasium and real gymnasium], Lvov, 1910, 480 pp., 5th edition, Lvov, 1912, 480 pp.

Antoni Łomnicki, *Trygonometrya analityczna*. Dla klas VI, VII i VIII [Analytical Trigonometry. For VI, VII and VIII classes], Lvov, 1912, 302 pp.

Ignacy Kranz, *Zbiór zadań matematycznych. Podręcznik dla wyższych klas szkół średnich zastosowany do instrukcyi ministerjalnych* 1900 r. [Collection of mathematics exercises. Handbook for higher classes of secondary schools, according to ministry instructions] by a professor of Saint Anna's gymnasium, Cracow 1902, 177 pp., 2nd edition, Cracow, 1905.

Ignacy Kranz, *Tablice pięciocyfrowe logarytmów liczbowych i funkcji trygonometrycznych do użytku szkolnego applied by professor* [Logarithm and function tables for schools] of Saint Anna's gymnasium, Cracow, 1900, XII + 126, 2nd edition, 1911 (not 1917), 139 + XVII pp.

Also Tables of logarithms by D. Wierzbicki were used (we do not have bibliographical data).

The presented list shows multicity of textbooks for lower forms of gymnasia, paraphrases and translations of foreign works. However, teaching in higher forms was based on domestic handbooks, this kind of mathematical exactness was closer to teachers who were graduates of the universities in Lvov and Cracow. What is interesting is that textbooks published in Lvov were used outside eastern Galicia, for instance in Cracow¹⁴⁰, like P. Dziwinski's handbook *Zasady algebry dla wyższych klas gimnazjów i szkół realnych* [The Rules of Algebra for higher Classes of Gymnasia and Real Schools]. This textbook was written in a systematic, precise way with the use of symbols. While discussing roots of complete equations of the second degree he even notes that when the discriminant of the

¹⁴⁰ See G. Komarzyniec, *Nauczanie matematyki w Krakowskiej Szkole Nowodworskiej w latach 1588–1914* [Teaching mathematics in Cracow Nowodworska School in 1588–1914], Wydawnictwo Naukowe Akademii Pedagogicznej, Cracow, 2004.

square equation is negative, then this equation has two complex conjugate roots. He proposes to solve systems of equations of the first degree in 5 ways including the method of determinants which was introduced in the case of four equations with four unknowns. The contents of teaching are presented by means of the lecture method. It is a textbook for rather more talented pupils, the material is too broad for an average pupil, it is a compendium of knowledge without the differential calculus.

Józef Puzyna in his review of Dziwiński's handbook notices that [the book] has its well-marked stages of development, its 'epochs' on which after finishing the material, one may have a discussion with the pupil without grasping a chalk and without going into too much detail. And this is what someone, who is not going to dedicate himself to mathematics, should retain from learning. Author's very fortunate thought is to place a brief outline of the history of mathematics..

Another textbook by Jerzy Miłoś – *Podręcznik arytmetyki* [Arithmetics textbook], Lvov, 1914 on arithmetics in the chapter *Zestawienie i rozszerzenie nauki o funkcjach* [Presentation and extension of study of functions] contains such sections as *Badanie ciągłości funkcji* [Investigating continuity of function], *Określenie pochodnej* [Defining the derivative], *Pochodne niektórych funkcji* [Derivatives of certain functions] such sections, *Zastosowanie pochodnej do badania przebiegu funkcji* [Application of derivative to investigating the behavior of function], *Druga pochodna* [Second derivative], *Maxima i minima funkcji* [Maxima and minima of function], *Przybliżone obliczanie pierwiastków równań* [Approximate calculation of roots of equations], *Z historii rachunku różniczkowego* [From the history of differential calculus]. Didactic analysis of these textbooks may be extremely fascinating, the questions being: are they adjusted to the pupil's mental abilities, are pedagogical principles obeyed, are those textbooks for talented pupils, what about less talented pupils, are various sections of mathematics combined around one issue, what is the role of drawings, models, measurements?

We can see that the presentation of mathematical method was the superior aim intended by the authors, reviewers and professors.