Roman Sznajder
Bowie State University
rsznajder@bowiestate.edu

On known and less known relations of Leonhard Euler with Poland[1]

Abstract

In this work we focus on research contacts of Leonhard Euler with Polish scientists of his era, mainly with those from the city of Gdańsk (then Gedanum, Danzig). L. Euler was the most prolific mathematician of all times, the most outstanding mathematician of the 18th century, and one of the best ever. The complete edition of his manuscripts is still in process (Kleinert 2015; Kleinert, Mattmüller 2007).

Euler's contacts with French, German, Russian, and Swiss scientists have been widely known, while relations with Poland, then one of the largest European countries, are still in oblivion. Euler visited Poland only once, in June of 1766, on his way

[1] This paper is dedicated to Ms. Anna Parczewska on the occasion of her 90th birthday.

This is an extended version of the presentation given at HPM Americas, March 14–15, 2015, American University, Washington, D.C. A draft version of this article was archived at Arxiv.org: https://arxiv.org/pdf/1505.02411&usg=AFQjCNGjNL4yhWepmd-bA2eOIwXRx3XSKw.

PUBLICATION INFO	Studia Historiae Scientiarum	e-ISSN 2543-702X ISSN 2451-3202	Polska Akademia Umiejętności	DIAMOND MODEL OPEN ACCESS

CITATION
SZNAJDER Roman 2016: On known and less known relations of Leonhard Euler with Poland. *Studia Historiae Scientiarum* 15, pp. 75–110.
DOI: 10.4467/23921749SHS.16.005.6148 Available online: http://pau.krakow.pl/SHS/shs-15-2016-5.pdf

RECEIVED: 29.09.2015 ACCEPTED: 18.10.2016 PUBLISHED ONLINE: 24.11.2016	ARCHIVE POLICY Green SHERPA / RoMEO Colour	LICENSE CC BY NC ND	Crossref

WWW http://pau.krakow.pl/Studia-Historiae-Scientiarum/ http://ejournals.eu/Studia-Historiae-Scientiarum

back from Berlin to St. Petersburg. He was hosted for ten days in Warsaw by Stanisław II August Poniatowski, the last king of Poland. Many Polish scientists were introduced to Euler, not only from mathematical circles, but also astronomers and geographers. The correspondence of Euler with Gdańsk scientists and officials, including Carl L. Ehler, Heinrich Kühn and Nathanael M. von Wolf, originated already in the mid-1730s. We highlight the relations of L. Euler with H. Kühn, a professor of mathematics at the Danzig Academic Gymnasium and arguably the best Polish mathematician of his era. It was H. Kühn from whom Euler learned about the Königsberg Bridge Problem; hence one can argue that the beginning of the graph theory and topology of the plane originated in Gdańsk. In addition, H. Kühn was the first mathematician who proposed a geometric interpretation of complex numbers, the theme very much appreciated by Euler.

Findings included in this paper are either unknown or little known to a general mathematical community.

Keywords: *Jowin Bystrzycki • complex numbers • Danzig Academic Gymnasium • Carl Gottlieb Ehler • Leonhard Euler • Königsberg bridge problem • Heinrich Kühn • King Stanisław August Poniatowski • Józef Rogaliński • Nathanael Matthaeus von Wolf*

O znanych i mniej znanych relacjach Leonharda Eulera z Polską

Streszczenie

W tej pracy skupiamy się na kontaktach badawczych Leonharda Eulera z polskimi naukowcami jego epoki, głównie z Gdańska (wtedy Gedanum, Danzig). L. Euler był najbardziej płodnym matematykiem wszystkich czasów, najwybitniejszym matematykiem osiemnastego wieku i jednym z najlepszych w historii. Kompletne wydanie jego rękopisów nie zostało dotąd zakończone (Kleinert 2015; Kleinert, Mattmüller 2007).

Kontakty Eulera z francuskimi, niemieckimi, rosyjskimi i szwajcarskimi naukowcami są powszechnie znane, a stosunki z Polską,

wtedy jednym z największych krajów europejskich, są nadal zapomniane. Euler odwiedził Polskę tylko raz, w czerwcu 1766 roku, w drodze powrotnej z Berlina do Petersburga.

Ostatni król Polski Stanisław August poniatowski gościł Eulera w Warszawie przez dziesięć dni. Wielu polskich naukowców przedstawiono Eulerowi, nie tylko z kręgów matematycznych, ale również astronomów i geografów. Korespondencja Eulera z gdańskimi naukowcami i urzędnikami, w tym Carlem L. Ehlerem, Heinrichem Kühnem i Natanaelem M. von Wolfem zaczęła się już w połowie lat 30. XVIII wieku. Wyróżniamy relacje L. Eulera z H. Kühnem, profesorem matematyki w Gimnazjum Akademickim w Gdańsku i prawdopodobnie najlepszym polskim matematykiem tamtej epoki. To od H. Kühna Euler dowiedział się o problemie mostów królewieckich. Dlatego można argumentować, że początek teorii grafów i topologii płaszczyzny wywodzi się z Gdańska. Ponadto, H. Kühn był pierwszym matematykiem, który zaproponował interpretację geometryczną liczb zespolonych, bardzo cenioną przez Eulera.

Ustalenia zawarte w niniejszym artykule są albo nieznane lub mało znane ogólnej społeczności matematyków.

Słowa kluczowe: *Jowin Bystrzycki • liczby zespolone • Gdańskie Gimnazjum Akademickie • Carl Gottlieb Ehler • Leonhard Euler • problem mostów królewieckich • Heinrich Kühn • król Stanisław August Poniatowski • Józef Rogaliński • Nathanael Matthaeus von Wolf*

1. Introduction

Leonhard Euler (1707–1783) was the central figure in science of the century. For a detailed account on his life and scientific activities, see the recent encyclopedic monograph.[2] However, most of the themes addressed in our article cannot be found in this source. For almost 60 years, Euler was working practically in all branches of mathematics and mechanics, in addition to undertaking research in astronomy, physics and engineering. All in all, Euler was responsible for about a third of the mathematical achievements of his time. Not only was he the greatest

[2] Cf. Calinger 2016.

mathematician of his era, but also the leading figure behind the reorganization of the research programs of two great academies: the Saint Petersburg Academy of Sciences – also called in Russia the Imperial Academy of Sciences and Arts – and the Royal Prussian Academy of Sciences in Berlin. He had numerous, but not well known, professional connections with Poland, which are the subject of this work.

Euler's academic activities are divided into three distinct periods:

1. St. Petersburg: 1727–1741,
2. Berlin: 1741–1766,
3. St. Petersburg: 1766–1783.

Fig. 1–2. Portraits of Euler by J.E. Handmann, 1753 and 1756 (http://commons.wikimedia.org/wiki/File:Leonhard_Euler.jpg)

The first period of Euler's work took place at then Academy in St. Petersburg, where he was invited at the initiative of Daniel (1700–1782) and Nicolas II (1695–1726) Bernoulli, two sons of his teacher, Johann Bernoulli (1667–1748). The Academy was founded by Tsar Peter the Great (1672–1725) in 1725. Shortly thereafter, in 1727, Euler arrived in St. Petersburg. In January 1731, he got a professorial position in the department of physics, and in the summer of 1733, moved to the department of mathematics, where he replaced Daniel Bernoulli, who returned to Switzerland. Euler spent 14 years in St. Petersburg. During that period he wrote 87 works, including close to 70 memoirs on a variety of topics

and two-volume *Mechanics* (1736).[3] His rise to scientific prominence was stellar. He left St. Petersburg for Berlin at the invitation of the King of Prussia, Frederick II (1712–1786), whose desire and ambition was to increase the prestige of the Academy in Berlin.

While leading the mathematics division of the Academy in Berlin for 22 years, Euler retained both the honorary membership of the Academy in St. Petersburg and his pension. He was publishing in both academies and was a research editor of the work of both of them, corresponded extensively with the external scientific world, and was responsible for hiring new collaborators, purchasing books and research instruments. In addition to his regular obligations, he served as an expert for the Prussian government. King Frederick II charged Euler with a series of various practical tasks related to civil engineering, ballistics, lottery organization, etc. His mathematical skills were put to work on leveling the Finow Canal.[4] The canal connects two rivers Havel and Oder through a small river Finow. Its construction started in 1605, but later subsided due to odd political circumstances. Frederick II was fully aware of its strategic significance. The canal also offered the shortest water connection from Berlin to Stettin (Szczecin).[5] After World War II, Oder river became the western Polish border.

2. Leonhard Euler and Stanisław II August Poniatowski, the last king of Poland

Euler's stay in Berlin became an opportunity to make acquaintance of several key figures of Polish political and scientific life, most notably the future king of Poland. At the beginning of 1750, the future – and last – king of Poland, Stanisław II August Poniatowski (1732–1798), visited Berlin for several months for medical treatment. On April 25, 1750, Poniatowski visited the Berlin Academy and most likely met Euler for the first time. Some years later, on November 8, 1764, Euler and his son Johann Albrecht witnessed the reading of a document entitled *Praise of Stanisław August, the new King of Poland*. Years later, in

[3] Cf. Eneström 1910–1913; Sandifer 2007; Gautschi 2008.
[4] Cf. Fellmann 1995, p. 86; Calinger 2016, pp. 309–310.
[5] For more on Finow Canal, we refer to *Wikipedia* 2016.

1791, Poniatowski also became a member of the Academy in Berlin.[6] There were several other prominent people from Polish nobility visiting the Academy and having an opportunity to meet Euler.

On June 9, 1766, Prince Adam Kazimierz Czartoryski (1734–1823), in the name of the king, invited Euler with his family to visit Poland. Euler accepted the invitation on the occasion of his return to St. Petersburg, where the Imperial Academy had invited him back repeatedly. On his way to Warsaw he stopped in Poznań and visited a prominent physicist, Rev. Józef Rogaliński (1728–1802), who built the astronomical observatory on the top of the Jesuit Collegiate in the city. Euler admitted that he "did not expect to see such quality equipment and mathematical instruments in Poland."[7]

From Poznań Euler left for Warsaw, where he spent ten days as a guest of king Poniatowski. After his stay in Warsaw, Euler left for St. Petersburg through Mitau (Jelgava) and Riga, and arrived at his destination on July 28, 1766. Soon after, on August 8, 1766, he sent a letter to the king warmly thanking him for the hospitality and reception he and his family experienced. Euler's visit led to a decade-long correspondence with the king.[8] The king followed Euler's work closely, and the cataloguing of the royal collection during 1793–1796 revealed many pieces of Euler's work on various topics.

Euler's visit in Warsaw went beyond personal contacts between the scientist and the king, and it contributed to Euler's research. For example, using data obtained from the observation of the sun eclipse in 1775 by Jowin F. Bystrzycki (1737–1821), Euler calculated the longitude of Warsaw. More importantly, Euler helped foster collaboration between the Polish and Russian scientific communities. During his short stay in

---

[6] Cf. Czerniakowska 2006, p. 6.

[7] Cf. Czerniakowska 2006, p. 7.

[8] The correspondence consists of 13 letters, of which 8 were written by Euler. Cf. Euler 1975, letters 2604–2616; "Euler's Correspondence", [in:] Klyve, Stemkoski, Tou 2016. The letters from Euler have been stored in the Central Archives of Historical Records (Archiwum Główne Akt Dawnych, the Popiel Collection) in Warsaw, Poland. There are 11 letters of this correspondence in Popiel Collection, Cf. Smirnov, Juškevič (eds.) 1967, p. 6. See also: Klado, Wołoszyński 1965.

Fig. 3. Stanisław II August Poniatowski, King of Poland
by Marcello Bacciarelli (1731–1818), ca. 1780
(http://niezlomni.com/?p=15243)

Warsaw,[9] Euler became acquainted with the royal cartographer, Carl Herman de Perthées (1739–1814) of French descent, born in Dresden. He started working for king Poniatowski in 1764, and sought, by the intercession of the king, information from scientists in St. Petersburg that was relevant to creating maps of Poland and the neighboring states. In his letter[10] to Euler on September 22, 1766, Perthées was asking for the geographical position of the city of Kiev. Ten years later, in his 1776 letter to king Poniatowski, Euler declared the willingness of the Academy in St. Petersburg to cooperate with the royal cartographer on exchange of information and cartography pieces. In his last letter (June 6, 1777), Euler congratulated the king on becoming the honorary member of the St. Petersburg Imperial Academy.[11]

Euler also had indirect influence on the advancement of Polish education. In June of 1766, Christoph Friedrich von Pfleiderer 1736–1821), a former student of George-Louis Le Sage (1724–1803), was

[9] Euler's visit in Warsaw was reported in the Toruń (Thorn) weekly, *Thornische Wöhentliche Nachrichten und Anzeigen nebst einem Anhange von Gelehrten Sachen*, 3 VII, 1766, p. 210.

[10] 1 Bl. – AAN, f. 1, op. 3, Nr. 35, p. 180 (The Archive of Russian Academy of Sciences, St. Petersburg).

[11] Popiel Collection (Archiwum Główne Akt Dawnych). Cf. Euler 1975, letters 2613, 2615–2616.

appointed professor of mathematics and natural philosophy in the famous *Szkoła Rycerska* (Knight's School, a military academy for the youth of Polish nobility).[12] In 1775, he undertook the responsibility of organizing a contest to select the best author to write textbooks of mathematics for Polish schools. Swiss mathematician, Simon A.J. L'Huillier (1750–1840) won this contest. L'Huillier was a former mathematics student of Louis Bertrand (1731–1812), a former disciple of L. Euler, and a physics student of G.-L. Le Sage. The Polish Prince Adam Kazimierz Czartoryski of Puławy was so impressed by L'Huillier that in 1777 he offered him a contract as a tutor of his son Adam Jerzy Czartoryski.

L'Huillier spent eleven years in Puławy, where he wrote numerous important and beautiful publications. L'Huillier's textbooks for Polish schools include: *Eléments d'arithmétique et de géométrie pour les écoles palatinales* (1778). Translated into Polish as: *Jeometrya dla szkół narodowych*. Part I (1780; 2. ed. 1785). Part II. (1781), *Arytmetyka dla szkół narodowych* (1781), *Algiebra dla szkół narodowych* (1782) (all translated to Polish by Andrzej Gawroński[13] (1740–1813)).

In the book *Polygonométrie et abrégé d' isopérimétrie élémentaire* (Gèneve 1789), he continued the work of Euler on polyhedral sets and started a new branch of geometry, *polyhedrometry* (science of polyhedrals).[14] Ch.F. Pfleiderer served not only as professor at *Szkoła Rycerska*, but also later as its program director. He spent 15 years in Poland.[15]

3. Leonhard Euler and the Danzig scientific community

In addition to his ties with the scientific community in Warsaw and Poznań, Euler established close connections with the scientists of the city of Gdańsk (in German "Danzig"). Even though Euler never visited Gdańsk, he left a deep mark on its scientific life.

---

[12] For more on Szkola Rycerska, we refer to Mrozowska 1961.

[13] Cf. Czerniakowska 2006, p. 9.

[14] Cf. L'Huillier 1812–1813.

[15] Cf. Mrozowska 1980. For a short bio of Ch. F. Pfleiderer, issued on the occasion of his appointment as a provost of the University of Tübingen, see Pfleiderer 1782.

Gdańsk, which is more than 1,000 years old, was then a wealthy former member of the Hanseatic League. Even though it had the status of a state-city – also called the Republic of Danzig – it recognized the protection of the king of Poland. The scientific community in Danzig attempted several times to establish its own academic organization, but these efforts failed. Finally, in 1742, the leadership of a physicist Daniel Gralath (1708–1767) resulted in the formation of the Experimental Physics Society (*Societas Physicae Experimentalis*). It became the second scientific society in Poland (after *Societas Litteraria* cuius symbolum virtutis et scientiarum incrementa, the Learned Society, 1720–1727) and the eleventh in the world. Since 1753, the Society also used the name Naturalist Society (*Naturforschende Gesellschaft*) and is now also referred to as the Danzig Research Society. The Society was active until 1945.[16]

During his first extended stay in Russia, Euler established ties with several Gdańsk scientists, including the mathematician and astronomer Carl Gottlieb Ehler (1685–1753) who corresponded with Leibniz and became the future mayor of Danzig (1740–1753), and Heinrich Kühn (1690–1769), a professor of mathematics at the Danzig Academic Gymnasium. Two other prominent scientists from Danzig, Johann Phillip Breyne (1680–1764) and Jacob Theodor Klein (1685–1759), started their collaboration with the Imperial Academy.[17] A recent book[18] presents quite an interesting account on the development of science and technology in Gdańsk.

3.1. Euler meets Carl Gottlieb Ehler

Carl G. Ehler played a dual role of a scientist and a diplomat. He was an important member of the delegation of six Gdańsk councilmen who arrived on September 29, 1734 at the court of the Empress of Russia, Anna Ivanovna (1693–1740), to seek forgiveness and reduction of reparations imposed on the city in the aftermath of the War of Polish Succession.[19] On July 9, 1734, after a prolonged siege during this

[16] Cf. Januszajtis 2001, p. 393; 2002, p. 330; 2011, p. 463.
[17] Cf. Kopelevich 1978, p. 328.
[18] Cf. Januszajtis 2015.
[19] Cf. Kopelevich 1978, p. 324.

war, Danzig capitulated and was briefly occupied by the Russian army. The city, which supported Stanisław Leszczyński (1677–1766), the losing candidate to the Polish throne, was forced to pay reparations of two million Danzig talars, and the delegation's intent was to obtain forgiveness of the second million. Tough negotiations ensued for several months, but the delegation succeeded and on April 29, 1736 Anna Ivanovna issued the document (*diploma amnestiae*) in which she pardoned Danzig, forgiving the second million of talars and reinstating city privileges.[20] During the negotiations, members of the delegation met with various Russian dignitaries and foreign diplomats. For example, they visited the Saint Petersburg Academy of Sciences, Admiralty, shipyards, and metallurgical plants in the vicinity of St. Petersburg. The stay at St. Petersburg gave Ehler the opportunity to meet Euler, either at the end of 1734 or at the beginning of 1735. After the delegation's nearly eight-month-long stay, on May 27, 1735, Empress Anna organized a farewell audience for the delegation. The group left St. Petersburg on June 3, 1735. The details of this visit are included in the report by Carl Ludwig Ehler, the son of Carl G. Ehler. The report is deposited in the Gdańsk Library of the Polish Academy of Sciences (Ms 122).[21]

During his stay in St. Petersburg, Carl G. Ehler participated in numerous meetings at the Imperial Academy, where, on March 7, 1735, Euler presented his *Mechanics*. There was also another scientific connection between Gdańsk and the Imperial Academy, as it displayed the letters of one of its most illustrious citizens, Jan Heweliusz (Johannes Hevelius) (1611–1687) – the most prominent Polish astronomer after Nicolaus Copernicus (1473–1543) – on May 13, 1735. These letters were acquired by a French scientist Joseph-Nicolas Delisle (1688–1768) from the inheritors of Jan Heweliusz in 1726 while Delisle was on the trip from Paris to St. Petersburg.[22]

After his return to Gdańsk, Carl G. Ehler corresponded with Euler. The archives of the Russian Academy of Sciences are in possession of

[20] Cf. Cieślak (ed.) 1993, p. 515.
[21] Cf. Czerniakowska 2006, p. 11.
[22] *Ibidem*, p. 12.

fifteen letters from Ehler to Euler and five letters from Euler to Ehler during 1735–1742. The sixth known letter, dated May 10, 1740, is preserved in the Manuscripts and Rare Books Department of the University of Tartu Library Estonia).[23] In this letter, Euler congratulated Ehler on the occasion of his election as the mayor of Gdańsk. On July 15, 1735, Ehler asked Euler for help in recommending his friend and protégé, Heinrich Kühn, to Georg Wolfgang Krafft (1701–1754) in the physics department of the Academy. In the letter to Krafft of September 24, 1739, Kühn informed of his research interests, including problems in mechanics based on the laws discovered by Christian Wolff (1679–1754), Isaac Newton (1643–1727) and Jakob Hermann (1678–1733), as well as *Mechanica (Mechanics)* by Leonhard Euler. Kühn expressed his wish to become an honorary member of the Imperial Academy. This honor was bestowed upon him on June 27, 1735, and Kühn was granted 100 rubles of annual salary.[24]

In late 1742, Carl Ludwig Ehler (the son of C.G. Ehler) paid a visit to Euler in Berlin. On December 19, 1742, both, father and son, sent two separate letters thanking Euler for "amiable reception" of C.L. Ehler.

3.2. Euler, Heinrich Kühn and other luminaries

Heinrich Kühn was born in Königsberg (Kaliningrad) in 1690, where he studied at the Pedagogicum. He then moved to Halle, where he studied law and obtained his Juris Doctorate degree. In 1717, he moved back to Königsberg to continue his studies in natural sciences. C.G. Ehler was a friend of Christian Wolff and H. Kühn was his former student, so it is quite likely that Ehler arranged for Kühn's settling in Gdańsk in 1733 where the latter taught at the Danzig Academic Gymnasium. As a native of Königsberg, Kühn was familiar with the Königsberg bridge problem, which asked whether it was possible to design a tour so that one crossed all the bridges over the Pregel river in Königsberg only once.

---

[23] Cf. Euler 1740; 1963, p. 386, https://utlib.ut.ee/en/collections.
[24] Cf. Kopelevich 1978, p. 325.

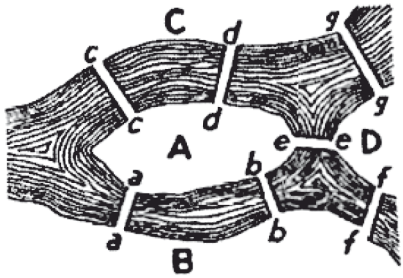

Fig. 4. The Königsberg Bridges
(Kraitchik 1953, Fig. 98, p. 210)

It is not completely clear how Euler learned about the Königsberg bridge problem. However, it is very likely that C.G. Ehler first discussed this problem with him around 1734/35, during his visit with the Gdańsk delegation in St. Petersburg. As it was already noted by a distinguished Russian science historian, Judith Ch. Kopelevich (1924–2009)[25], in his letter[26] of March 9, 1736 Ehler wrote about this problem: "we were discussing it in St. Petersburg." In the same letter, Ehler writes:

> You would render to me and our friend Kühn a most valuable service, putting us greatly in your debt, most learned Sir, if you would send us the solution, which you know well, to the problem of the seven Königsberg bridges, together with a proof. It would prove to be an outstanding example of *Calculi Situs*, worthy of your great genius. I have added a sketch of the said bridges [...]

On April 3, 1736, Euler replied:

> [...] Thus you see, most noble Sir, how this type of solution bears little relationship to mathematics, and I do not understand why you expect a mathematician to produce it, rather than anyone else, for the solution is based on reason alone, and its discovery does not depend on any

[25] Cf. Kopelevich 1978, p. 325.
[26] 3 Bl. – AAN, f. 1, op. 3, Nr. 21, pp. 35–37.

> mathematical principle. Because of this, I do not know why even questions which bear so little relationship to mathematics are solved more quickly by mathematicians than by others. In the meantime, most noble Sir, you have assigned this question to the geometry of position, but I am ignorant as to what this new discipline involves, and as to which types of problem Leibniz and Wolff expected to see expressed in this way [...][27]

Even though, as the quote above indicates, Euler was initially skeptical of the new subdiscipline called the geometry of position (*calculi situs*, mentioned in Ehler's letter), he changed his opinion under the influence of Kühn. On August 28, 1735, Euler presented the solution to the Königsberg bridge problem (in the negative) and its generalizations, to the St. Petersburg Academy. It was published in 1741 (due to a delay in print).[28] Following Kühn's suggestion, he incorporated the phrase

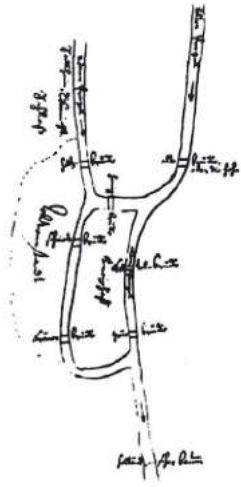

Fig. 5. Königsberg bridge problem
(From Ehler's letter to Euler [March 9, 1736])

[27] Cf. Euler 1963, pp. 330–353; 21. Bl. – AAN, f. 1, op. 3, Nr. 22, pp. 21–41; Hopkins, Wilson 2004, p. 201.

[28] Cf. Euler 1736. For a modern and short proof of the bridge problem, cf. Wilson 2012.

geometry of position into the title of this work. With Euler's paper, graph theory and topology (*geometria situs*) were born. Thus, one can argue that *geometria situs* indirectly started in Gdańsk.[29] Interestingly enough, Euler never visited Gdańsk or Königsberg and never met Kühn in person.

Euler initially corresponded with Kühn through C.G. Ehler. In the course of their correspondence, Kühn delivered a solution to one of the problems posed by Euler and then, in May of 1735, he sent a manuscript of his paper on some properties of complex numbers, a theme that Euler was very much interested in. In his numerous publications, Kühn presented many original ideas. His crowning achievement was "Meditationes de quantitatibus imaginariis construendis et radicibus imaginariis exhibendis" (*Considerations over Constructing Imaginary Quantities and Extracting Imaginary Roots*) from 1750/51, published 3 years later in *New Commentaries of the Petersburg Science Academy*,[30] which won him an honor of

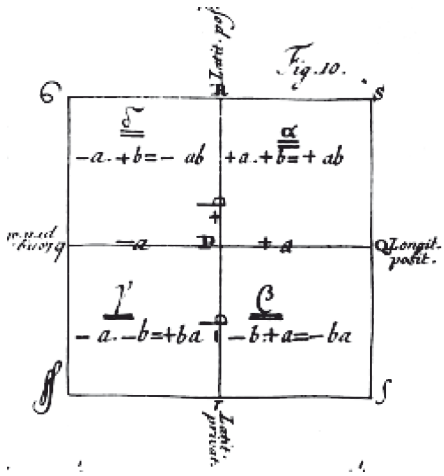

Fig. 6. Kühn's complex numbers diagram
(Kühn 1753, Fig. 10, p. 479)

[29] Cf. Przytycki 2007, p. 13; 2010, p. 2; 2016, p. 10. For a detailed account on Euler's input to graph theory and polyhedral sets, see Richeson 2008. Even though we cannot treat it as a true historical source, it is a nice survey of the development of both disciplines.

[30] Cf. Kühn 1753.

a corresponding member of the Academy. In addition, another little-known fact is that Kühn was the first person to give a geometric interpretation of complex numbers.

It is interesting to note that the orientation (enumeration of quadrants) of this diagram is clockwise, contrary to the counterclockwise orientation used nowadays[31].

J.Ch. Kopelevich noted that the correspondence between Euler, Ehler and Kühn represented an interesting contribution to the psychology of scientific research involving team work in solving mathematical problems.[32]

In 1737, Kühn was already directly corresponding with Euler. In his letters, Euler expressed a high opinion about Kühn's achievements, see, e.g., his letter[33] (April 1742) to a French mathematician and astronomer, Alexis Claude Clairaut (1713–1765), where Euler wrote about H. Kühn as "one of the best German mathematicians." Euler, through his prolific correspondence, contributed to spreading Kühn's name in the European scientific community. There exist 22 letters from Kühn to Euler for the period of 1737–1754, and 2 letters from Euler to Kühn. His paper, on the origins of water springs and ground water, submitted to the St. Petersburg Academy, drew the attention of numerous scientists. G.W. Krafft and C. Goldbach (1690–1764) shared their opinions with Euler. This work, which was a result of Kühn's research in mechanics and hydrology, was earlier awarded a prize by the Bordeaux Scientific Society in 1741 at the competition, with the original title *Meditationes de origine fontium et aquae putealis aliisque affinis argumenti problematibus*. The paper was important because it examined the problem of the shape of the earth.[34]

As a professor of mathematics at the Danzig Academic Gymnasium, during the years 1735–1770, Kühn became the editor of the calendar, which was distinguished by its high editorial level and interesting con-

---

[31] I am grateful to Dr. Frederick Rickey from Department of Mathematical Sciences United States Military Academy, West Point, for turning my attention to this observation.

[32] Cf. Kopelevich 1978, p. 327.

[33] 4 Bl. – AAN, f. 136, op. 2, Nr. 1, pp. 207–210.

[34] Cf. Czerniakowska 2006, p. 15.

tent. He became one of the founding fathers of the *Societas Physicae Experimentalis* (Danzig Research Society) and one of its most active members. In the first of the five treaties printed in 1747 in the *Versuche und Abhandlungen der Naturforschenden Gesellschaft in Danzig* (*Experiments and Dissertations of the Danzig Research Society*), Kühn described the prototype of an analytical scale and pioneered the theory of scales and weighing.[35] In 1758, on the occasion of the anniversary of the Academic Gymnasium, he gave a brilliant and inspiring lecture, *About the Influence of Mathematics and Natural Sciences on the Worldly Happiness of Humankind*.[36] By all means, Heinrich Kühn was the most outstanding Polish mathematician of the century. In his letter dated October 28, 1741, Kühn expressed hope that Euler would pay a visit to Gdańsk. Unfortunately, Euler left St. Petersburg for Prussia by ship and stopped only in the city of Stettin (Szczecin).

Even though Euler never made it to Gdańsk, he continued to maintain ties with prominent Gdańsk figures. In 1742, Euler hosted a prominent Gdańsk lawyer, Johann Friedrich Jacobsen. Jacobsen's diary bears the following inscription, written by Euler in May of 1742 (a quote from *Thyestes,* by L. Seneca):

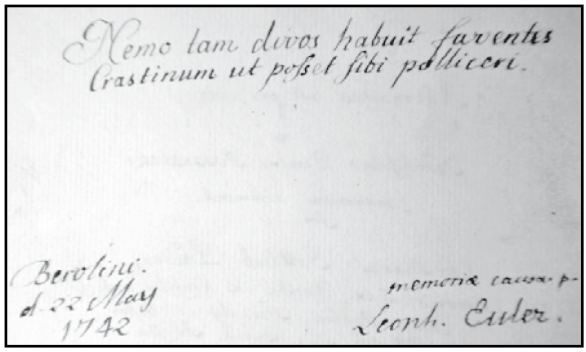

Fig. 7. Jacobsen's diary (May of 1742)
(Gdańsk Library of the Polish Academy of Sciences, MS 2512)

[35] Cf. Kühn 1747.
[36] Cf. Kühn 1758.

Nemo tam divos habuit faventes
Crastinum ut posset sibi polliceri.
Berolini, d. 22 May 1742 memoria causa p.

Leonh. Euler.

Which means:
No one would have tomorrow such friendly gods
as one can expect today.
For memory
Leonh. Euler.

The original of this diary is in the Gdańsk Library of the Polish Academy of Sciences.[37] The diary, in its own way, is an interesting historical artifact. The front page reads:

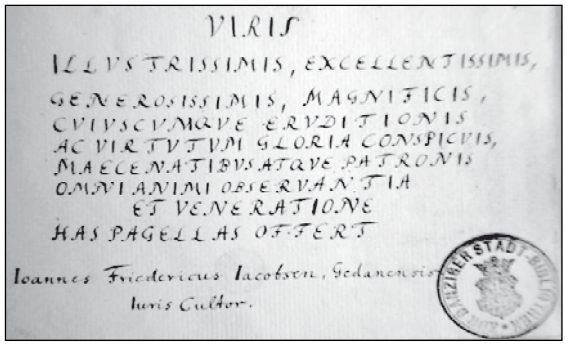

Fig. 8. Jacobsen's diary
(Gdańsk Library of the Polish Academy of Sciences, MS 2512)

VIRIS
Illustrissimis, excellentissimis,
generosissmis, magnificis,
cuiuscumque eruditionis
ac virtutum gloria conspicuis,

[37] Cf. Gdańsk Library of the Polish Academy of Sciences, MS 2512.

maecenatibus atque patronis
omni animi observantia
et veneratione
has pagellas offert
Ioannes Fredericus Iacobsen, Gedanensis Iuris Cultor

This translates as:

TO GENTLEMEN
Most illustrious, most excellent,
most generous, most splendid,
in visible glory of education and virtues,
patrons and curators
with wholehearted reverence and admiration
this page is being offered by
Joannes Fredericus Jacobsen, the Curator of Gdańsk Law[38]

There were several other Polish scientists who collaborated with the St. Petersburg Academy and had contacts with Euler. Among them was Jan Michał Hube[39] (1737–1807) of Toruń, a student of Abraham Gotthelf Kästner (1721–1800) in Göttingen, later professor of mathematics and physics, and subsequently the Rector of *Szkoła Rycerska* in Warsaw (1781). In his letter of March 12, 1759[40] Hube asked Euler to express opinion on his textbook, *Versuch einer analytischen Abhandlung von den Kegelschnitten mit einer Vorrede von A.G. Kästner*, Göttingen, 1759 (*Treatise on conic sections*).[41] Euler praised the method proposed in the textbook in his letter to Hube on April 3, 1759.[42] Hube also was the author of the first modern physics textbooks[43] in Polish, written at

[38] I am indebted to Ms. Anna Parczewska for her help with translation of these excerpts.

[39] Cf. Mrozowska 1962–1964, pp. 67–69.

[40] 1 Bl. – ANN, f. 136, op. 2, Nr. 5, p. 254.

[41] According to Gert Schubring (2006, p. 135), "it was probably the first elementary textbook of analytic geometry ever published".

[42] Czerniakowska 2006, p. 16. It is the only source where I found this information.

[43] Cf. Hube 1783; 1792.

the request of the Commission of National Education. Moreover, he wrote a book in the form of letters;[44] in spirit, they essentially resembled a known Euler's collection.[45] Hube was a superb applied mathematician, as indicated by a noted Polish math and science historian, Prof. Feliks Kucharzewski (1849–1935).[46]

3.3. Euler and Nathanael Matthaeus von Wolf

Euler and his family developed particularly close and warm relationship with a Gdańsk physician, astronomer and botanist, Nathanael Matthaeus von Wolf (1724–1784), whom Euler met in 1761. As is apparent from Wolf's letter to the oldest son of Euler, Johann Albrecht, dated March 8, 1767,[47] Wolf and L. Euler became friends in 1766 while the latter was visiting Warsaw.

Nathanael Wolf studied in Jena, Halle, Leipzig and Erfurt. He obtained his degree in medicine in 1748 and became a court doctor for the Lubomirski and Czartoryski, Polish aristocratic families. He became a member of the Danzig Research Society (1776) and the Royal Society in London (1777). In 1765–1769, N. Wolf conducted astronomical observations in the Blue Palace in Warsaw while working at the Corps of Cadets as a physician general of the Polish military. In 1768, he was knighted by king Poniatowski. In 1769, Wolf started practicing medicine in Tczew, a town in the vicinity of Gdańsk. In 1772, after the First Partition of Poland, he moved to Gdańsk, which was still under the Polish jurisdiction, so as not to become a Prussian citizen, and opened his doctor's office there. In 1781, using his own funds, Wolf built his astronomical observatory on Bishop's Hill and equipped it with state-of-the-art instruments. Wolf sent the Imperial Academy the results of his observations of the sun eclipse from October 17, 1781. His observatory gained an excellent reputation in the rest of

---

[44] Cf. Hube 1791. The quoted work entitled in German, *Vollständiger und fasslicher Unterricht in der Naturlechre in einer Reihe von briefen an einen jungen Herrn vom Stande,*was issued in Leipzig in an extended format (4 volumes) in 1801. Most likely, only the first volume exists in Polish.

[45] Cf. Euler 1768.

[46] Cf. Kucharzewski 1928, pp. 811–816.

[47] Cf. Wolf 1767.

Europe for the accuracy of its observational data. The observatory was destroyed during the Napoleonic war by the Russians during the siege of Gdańsk in 1813.

Wolf's botanical work, *Genera plantarum, Vocabulis characteristicis definita* was published in 1776. This is the place where the genus name *Vincetoxicum* was first published. The botanical genus name is derived from the Latin words for *vinci* – win, defeat and *toxicum* for poison. This refers to the purported effects of vegetable juice as an antidote against snake venom.[48]

Wolf was a strong proponent of the inoculation against smallpox, which was plaguing the population every several years. Children were the most vulnerable group. Initially, Gdańsk society was very reserved but gradually acquiesced, and in 1774, the City Council accepted inoculation. N. Wolf was the only doctor who was prepared to perform the procedure.

Fig. 9. Nathanael Matthaeus von Wolf (1724–1784)
(http://en.wikipedia.org/wiki/Nathanael_Matthaeus_von_Wolf)

[48] Cf. *Memin Encyclopedia* 2016.

Fig. 10. View of the City of Gdańsk from Bishop's Hill
(Pre-WWII postcard of Gdańsk)

Fig. 11. Gdańsk Library of the Polish Academy of Sciences
(From the collection of the author)

N.M. von Wolf died in December of 1784 while helping his fellow citizens battle the flu epidemic. His organism, weakened in his youth by tuberculosis, could not defend itself anymore.

3.4 Euler and other of his correspondents

Research interests of Michael Christoph Hanow (1695–1773) comprised a wide spectrum of disciplines: law, theology, philosophy (M.C. Hanow was a strict follower of philosophy of Christian Wolff), natural sciences, and mathematics. He studied in Leipzig. In 1724, he arrived in Gdańsk and soon became a professor at the Danzig Academic Gymnasium and later (1727) its Rector. In 1736, he became the editor of the first popular science journal, *Erläuterte Merkwürdigkeiten der Natur*, he was also a pioneer of *meteorology*. Hanow was a founding member of the *Societas Physicae Experimentalis* (Danzig Research Society, 1743). He was a polyglot (and was speaking Polish, as well). He did not correspond with Euler, but in two letters (G.F. Müller to and from Euler), Hanow's name was mentioned.[49] In a letter to L. Euler[50] (October 28, 1741), C.G. Ehler included a (negative) opinion on Hanow's work on squaring circle: *Impossibilitas Quadraturae circluli a priori adserta*.[51] There are two letters of Hanow, preserved in the Manuscripts and Rare Books Department of the University of Tartu Library, to his nephew, Johann Daniel Titius (December 17, 1763 and August 17, 1764).[52]

Johann Daniel Titius[53] (Tietz) (1729–1796) has primarily been known as a Polish-German astronomer. He was born in Konitz (Chojnice) as a son of Barbara Dorothea Hanow. As his father, Jacob Tietz, orphaned him early, Titius was sent to Gdańsk under the wings of his uncle, M.C. Hanow. He graduated from the Danzig Academic Gymnasium and started his studies at the University of Leipzig in 1748. In 1756 he was appointed an ordinary professor at the University of Wittenberg, and later became its rector (1768). Titius was a prolific author and the editor of six periodicals in natural sciences. Apart from astronomy, his research focused on physics (theoretical and experimental, especially *thermometry*) and biology. He also wrote historical works, including a history of West Prussia and Wittenberg, a description of the conquest of

[49] 2+2 Bl. – AAN f. 21, op. 3,Nr. 309/3, pp. 9–12; 2 Bl. – AAN f. 1, op. 3, Nr. 40, pp. 130–131.

[50] 2 Bl. – AAN, f. 136, op. 2, Nr. 1, pp. 79–80.

[51] Cf. Hanow 1741.

[52] Cf. Hanow 1763; 1764.

[53] Cf. Folkerts 1976/2008; Czerniakowska 1998.

West Prussia by Kasimir IV in 1454–1466.[54] Many of his historical works are related to Gdańsk.

Nowadays, J.D. Titius's name has mainly been associated with the Titius-Bode law of planetary distances. In his only letter[55] to Euler (December 25, 1752), Titius asked for comments on his *Dissertatio Inauguralis, Luminis lunaris theoria nova, argumentis CL. Euleri superstructa*.[56]

Two other Euler's correspondents from Gdańsk were mathematician Gabriel Jonathan Schleissner who, in his letter[57] on September 1, 1776, presented his thoughts about the accurate calculations of square roots of non-square numbers and on squaring the circle, and Daniel Gottlob Davisson (1721–ca.1789), who in his letter[58] on May 29, 1771, asked Euler to send him a continuation of the paper by Kühn[59] (1753). D.G. Davisson's mother, Philippine Charlotte Henrichson (1702–1767), was a granddaughter of Jan Heweliusz. Davisson was a student of Kühn in the Danzig Academic Gymnasium (1739–1744) and was later continuing his studies in Leipzig. After returning to Gdańsk, Davisson was active as a mathematician, merchant, as well as a secret military adviser to the Polish king. He was not only corresponding with Euler, but also with Johann Heinrich Lambert (1728–1777) and Johann III Bernoulli (1744–1807), whom Davisson met in 1778 in Gdańsk while the former was on a trip through Europe.[60] J. Bernoulli visited the grave site of J. Heweliusz in the St. Catherine's Church. He was unimpressed as he saw only a modest gravestone there. It was Bernoulli's idea to build an epitaph honoring this great astronomer. Most likely, he was also the co-author of the epitaph, which was funded by D.G. Davisson in 1780. The inscription reads: *Johanni Hevelio ea ovae tanto debetur viro pietate* (to Jan Heweliusz with respect owed to such a great man). In 1759, Davisson married Carolina Beate von Bagge, his 2nd cousin, who was also a great-granddaughter of J. Heweliusz. Davisson owned a sizeable

---

[54] Cf. Titius 1763.
[55] 2 Bl. – AAN, f. 136, op. 2, Nr. 6, pp. 229–230.
[56] Cf. Titius 1752.
[57] 5 Bl. – AAN, f. 1, op. 3, Nr. 60, pp. 190–194.
[58] 2 Bl. – AAN, f. 1, op. 1, Nr. 59, pp. 43–44.
[59] Cf. Kühn 1753.
[60] Cf. Bernoulli 1779.

library with a large collection of mathematics and natural science manuscripts. The library also included the H. Kühn's book and manuscript collection.[61]

Fig. 12. Epitaph in honor of Jan Heweliusz
(Courtesy of Ms. M. Chróścicka)

The most important educational institution in Malbork (Marienburg) was the Latin School (Lateinschule), founded by the Grand Master, Winrich von Kniprode, in the last quarter of the 14th century[62]. The city of Malbork, located some 60 km south of Gdańsk, has been known for its castle, built in 1274, that was the headquarters of the Teutonic Knights and the largest castle (by surface area) in the world. The director of the Latin School, Johann Daniel Dannies, within one year (February 22 to November 17, 1753) sent Euler three letters with manuscripts for review about the immortality of the soul.[63]

[61] Cf. Czerniakowska 2012.
[62] Cf. Wiese 1864, pp. 75–76.
[63] 2 Bl. – ANN, f. 136, op. 2, Nr. 5, pp. 181–182, 183–184, 185–186.

4. Johann Albrecht Euler and Polish scientists

Leonhard Euler shared his passion for science with his oldest son, Johann Albrecht Euler. There are numerous known academic contacts of Johann Albrecht Euler (1734–1800) with Polish scientists. He became the secretary of the Imperial Academy in 1769. In 1794, he became a member of the Danzig Research Society. As the secretary of the Academy, he sent, on December 5, 1792, annals of two periodicals to the Society's library, beginning in the year 1780: *Acta Academiae Scientiarum Imperialis Petropolitanae* and *Nova Acta Academiae*...[64] On January 29, 1792, J.A. Euler received a letter from Ch.F. Pfleiderer sent January 12, 1792 from Tübingen[65] – recommending Gdańsk Observatory of late N.M. von Wolf for its high quality of astronomic observational data.

Fig. 13. Johann Albrecht Euler (1734–1800) by J.E. Handmann (1756) (http://photos.geni.com/p9/2468/5991/534448379a7ebfb4/EulerJA_original.jpg)

[64] Cf. Czerniakowska 2006, p. 20.
[65] Cf. Pfleiderer 1792.

Among individual Polish scholars, J.A. Euler corresponded with a Vilnius astronomer Marcin Poczobutt-Odlanicki (1728–1810), whom he informed in a letter of December 19, 1777, about the discovery of a new comet by J.A. Lexell.[66]

Renowned Polish scientist, mathematician, and astronomer, Jan Śniadecki (1756–1830) from Vilnius, studied Leonhard Euler's works (very likely with A.G. Kästner) as a student at the University of Göttingen. Śniadecki corresponded with Nicolaus Fuss[67] (1755–1826) from Basel, who became a secretary of the Academy in 1800, succeeding J.A. Euler after his death.

N. Fuss obtained a letter of May 5, 1802[68] of another Polish astronomer, Marcin Poczobutt-Odlanicki mentioned above, where he describes his astronomical observations. Poczobutt greatly contributed to the construction of the observatory in Vilnius, which became a European-class research institution.

In 1783, N. Fuss, a former student (and grandson-in-law) of L. Euler and later an editor of his works, wrote a eulogy for Euler, which is a masterpiece in its own right. Here is a fragment of Fuss's Eulogy (footnote 8),[69] which highlights Euler – Poland relations:

> (8) Throughout his life he preserved the sweet memory of the great goodness that the King showed him and the bonding which inspired his affection towards this heartfelt and spiritual prince and this continued through a correspondence which he had the honor to maintain with him. I cannot withstand the temptation to ornament this eulogy with one of these letters that the king wrote in 1772:
>
> Professor Euler. In responding to your letter of past 4 August, I had hoped to be able to confirm your belief

[66] Cf. Czerniakowska 2006, p. 20. Again, it is the only source where I found this information.

[67] Letter of 1815 on donating two volumes of his work *Pisma rozmaite* (1814a; 1814b), and the last 6th volume of *Dictionary of Polish language* by M. Samuel Linde (1814) to the Imperial Academy of Sciences and Arts.

[68] Cf. Odlanicki-Poczobut 1802.

[69] Cf. Fuss 1783.

about more auspicious circumstances, dictated by your friendship toward me expressed through a virtuous and sensible heart. But ... I thank you nonetheless for your good wishes in this regard, and I continue on to the recognition that I owe for your care in communicating to me the observations that the skillful astronomers of your Academy made at Bender and near the mouths of the Dniestr and the Danube with the locations of some places equally important to geography. I attempt to put them to good use to perfect those being made in this country with enough hard work and success, despite the troubles which are a great obstacle to scientific progress. I request that you continue to keep me apprised, as much for public use as for my own personal satisfaction, and hoping to have opportunities to show a token of my appreciation, I pray to God that He has you, Professor Euler, in His holy and worthy keeping.

Written at Warsaw, 7 June 1772

King Stanislaus Augustus

(Translation by Aleksandra Sznajder Lee)

Fig. 14. Portrait of Euler by Joseph F.A. Darbes (1778) (Pinterest 2016)

5. Acknowledgements

I would like to express my gratitude to Ms. Małgorzata Czerniakowska, a curator of the Gdańsk Library of the Polish Academy of Sciences, for a long conversation and sharing her work.[70] I am also indebted to the Director of the Library, Dr. Zofia Tylewska-Ostrowska, for giving me permission to photograph pages of J.F. Jacobsen's diary[71] and present them in this paper. I would like to thank an exceptional knot theorist Professor Józef H. Przytycki of The George Washington University, for his suggestions, notes, and a copy of his book.[72] My thanks also go to Professor Frederick Rickey from Department of Mathematical Sciences US Military Academy West Point for many critical comments on a draft version of this paper, and Ms. Karyna Świstak from the University of Maryland College Park Engineering and Physical Sciences Library. Finally, I am indebted to Dr. Aleksandra Sznajder Lee, Associate Professor of Political Science at the University of Richmond, for her translation of the letter of king Poniatowski. Last, but not least, I wish to thank anonymous referees for their hard work reading this manuscript, inquisitive and very helpful comments, which considerably improved the original version. I also thank the editor of this volume, Professor Michał Kokowski for his numerous suggestions and the editorial work.

Bibliography

ARCHIWUM GŁÓWNE AKT DAWNYCH, CENTRAL ARCHIVES OF HISTORICAL RECORDS, WARSAW, POLAND
Zbiór Popielów (Popiel Collection).

BERNOULLI Johann III
1779: *Reisen durch Brandenburg, Pommern, Preussen, Curland, Russland und Polen in Jahren 1777 und 1778*. Leipzig: Caspar Fritsch. Bd. I, pp. 282–287, 298–299, Bd. II, pp. 212–213. Available online: https://books.google.

[70] Cf. Czerniakowska 2006.
[71] Cf. Gdańsk Library of the Polish Academy of Sciences, MS 2512.
[72] Cf. Przytycki 2016.

pl/books?id=t0hCAAAAcAAJ (Bd. I.); https://books.google.pl/books?id=xEhCAAAAcAAJ (Bd. II.) (retrieved: 28/12/2016)

CALINGER Ronald S.
2016: *Leonhard Euler. Mathematical Genius in the Enlightenment*. Princeton, USA: Princeton University Press. ISBN 978-0-691-11927-4.

CIEŚLAK Edmund (ed.)
1993: *History of Gdańsk* (in Polish). Vol. III (1): 1655–1793. Gdańsk, Poland: Polish Academy of Sciences, Institute of History. ISBN 83-215-3251-9.

CZERNIAKOWSKA Małgorzata
1998: Titius (Tietz) Jan Daniel (1729–1796). *Słownik Biograficzny Pomorza Nadwiślanskiego*, supl. I, pp. 320–321, Gdańsk: Gdańskie Towarzystwo Naukowe, Uniwersytet Gdański.
2006: *Leonard Euler (1707–1783) and Poland* (in Polish). Gdańsk: Published by the author. ISBN 83-924379-2-6.
2012: Davisson, Daniel Bogumił (1729–ca. 1789). *Słownik Biograficzny Pomorza Nadwiślanskiego*, supl. III, pp. 64–65, Gdańsk: Gdańskie Towarzystwo Naukowe, Uniwersytet Gdański.

ENESTRÖM Gustaf
1910–1913: *Verzeichnis der Schriften Leonhard Eulers*. Leipzig: Teubner (*Jahresbericht der Deutschen Mathematiker-Vereinigung, Ergänzungsband* 4). [A simplified version of the Eneström Index is available at http://eulerarchive.maa.org/index/enestrom.html.] (retrieved: 28/12/2016)

EULER Leonhard
1736: Solutio problematis ad geometriam situs pertinentis. *Commentarii Academiae Scientiarum Imperialis Petropolitanae* 8, pp. 128–140.
1740: Letter to Carl G. Ehler (Petropolis, October 5, 1740). Preserved in the Manuscripts and Rare Books Department of the University of Tartu Library. Available online at the University of Tartu Library, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/5555/euler_10_05_1740.pdf. (retrieved: 28/12/2016)
1963: *Pis'ma k uchenym*, Izd. Akademii Nauk SSSR, Moscow–Leningrad.
1768: *Lettres a une princesse d'Allemagne sur divers sujets de physique et de philosophie*. St. Petersbourg: Imprimerie de l'Academie Imperiale des Sciences.
1975: Opera omnia, Series IVA *Commercium epistolicum*, vol. 1. *Leonhardi Euleri Commercium Epistolicum. Descriptio Commercii Epistolici / Leonhard Euler Briefwechsel. Beschreibung Zusammenfassungen der Briefe und Verzeichnisse*. Edited by Adolf P. Juškevič, Vladimir I. Smirnov, Walter Habicht. Basel: Birkhäuser.

FELLMANN Emil A.
1995: *Leonhard Euler*. (rororo Biographie), Rowohlt, Hamburg. ISBN 3-499-50387-5. English translation (by Erika and Walter Gautschi), Birkhäuser, 2007. ISBN 978-3-7643-7538-6.

FOLKERTS Menso
1976:/2008: Titius (Tietz) Johann Daniel. *Dictionary of Scientific Biography* vol. 13, pp. 424–426. New York: Charles Scribner's Sons. Electronic edition 2008: *Complete Dictionary of Scientific Biography*. *Encyclopedia.com*. Available online: http://www.encyclopedia.com/doc/1G2-2830904338.html (retrieved: 28/12/2016).

FUSS Nicolas
1783: Éloge de monsieur Léonard Euler, lu a l'Academié Impériale des Sciences. St. Petersburg 1783. Available online: http://www.gap-system.org/~history/Extras/Euler_Fuss_Eulogy.html (retrieved: 28/12/2016).

GDAŃSK LIBRARY OF THE POLISH ACADEMY OF SCIENCES
Johann Friedrich JACOBSEN's Diary, MS 2512.

HANOW Michael Christoph
1741: *Impossibilitas Quadraturae circluli, a priori adserta*. Gedani: Schreiberus. Available online: https://books.google.pl/books?id=xyZQAAAAcAAJ.
1763: Letter to Johann Daniel Titius (December 17, 1763). Preserved in the Manuscript Department of the University Library of Tartu. Available online at the University Library of Tartu, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/5421/hanov_17_12_1763.pdf (retrieved: 28/12/2016).
1764: Letter to Johann Daniel Titius (August 17, 1764). Preserved in the Manuscript Department of the University Library of Tartu. Available online at the University Library of Tartu, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/5421/hanov_17_08_1764.pdf (retrieved: 28/12/2016).

HOPKINS Brian, WILSON Robin J.
2004: The Truth about Königsberg. *The College Mathematics Journal* 35(3), pp. 198–207. Available online: https://www.maa.org/sites/default/files/pdf/upload_library/22/Polya/hopkins.pdf (retrieved: 28/12/2016).

HUBE Jan Michał
1759: *Versuch einer analytischen Abhandlung von den Kegelschnitten mit einer Vorrede von A. G. Kästner*. Göttingen.

1783: *Introduction to Physics for national schools. Part I*. Mechanics, textbook. Polish translation from Latin) by Jan Koc. Kraków.

1791/1801: *Letters in Physics or natural sciences adopted for a general use. Part I* (in Polish). Warszawa: Drukarnia P. Zawadzkiego. Available online: http://jbc.bj.uj.edu.pl/Content/323426/NDIGSTDR014485.pdf (retrieved: 28/12/2016). A German translation – 1801: *Vollständiger und fasslicher Unterricht in der Naturlehre in einer Reihe von Briefen an einen jungen Herrn vom Stande*. Leipzig (4 volumes).

1792: *Physics for national schools (Part I. Mechanics)*, teacher's manual. Polish translation from Latin) by Jan Koc. Kraków.

GAUTSCHI Walter

2008: Leonhard Euler: His Life, the Man, and His Works. *SIAM Review* 50(1), pp. 3–33. Available online: http://euler-2007.ch/doc/EulerLec.pdf (retrieved: 28/12/2016).

JANUSZAJTIS Andrzej

2001: Scientists in old Gdańsk: and centuries. *Task Quarterly* 5(3), pp. 389–399. Available online: http://task.gda.pl/files/quart/TQ2001/03/TQ0305Z5.PDF (retrieved: 28/12/2016).

2002: Societas Physicae Experimentalis – the first Physics Society in Poland. The origins of the Society. *Task Quarterly* 6(2), pp. 323–330. Available online: http://task.gda.pl/files/quart/TQ2002/02/TQ0206Z3.PDF (retrieved: 28/12/2016).

2011: A Walk Around Gdańsk for Physicists. *Physics in Perspective* 13/4, pp. 456–480. DOI: 10.1007/s00016-011-0066-5. Available online: http://link.springer.com/article/10.1007/s00016-011-0066-5 (retrieved: 28/12/2016).

2015: *Z dziejów gdańskiej nauki, 2nd* Edition (in Polish). Gdańsk, Poland: Wydawnictwo Politechnki Gdańskiej. ISBN 978-83-7348-605-8.

KLEINERT Andreas

2015: Leonhardi Euleri *Opera Omnia*: Editing the works and correspondence of Leonhard Euler. *Studia Historiae Scientiarum XIV*, pp. 13–35. Available online: http://pau.krakow.pl/PKHN-PAU/pkhn-pau-XIV-2015-2.pdf (retrieved: 28/12/2016).

KLEINERT Andreas and MATTMÜLLER Martin

2007: Leonhardi Euleri Opera Omnia: a centenary project. *European Mathematical Society*, 65, pp. 25–32. Available online: https://www.ems-ph.org/journals/newsletter/pdf/2007-09-65.pdf (retrieved: 28/12/2016).

KLYVE Dominic, STEMKOSKI Lee, TOU Erik
2016: The Euler Archive. A digital library dedicated to the work and life of Leonhard Euler. Hosted by the Mathematical Association of America. Available online: http://eulerarchive.maa.org/index.html (retrieved: 28/12/2016)

KŁADO Tatiana, WOŁOSZYŃSKI Ryszard W.
1965: Korespondencja Stanisława Augusta z Leonardem Eulerem, petersburską Akademią Nauk 1766-1783. *Studia i Materiały do Dziejów Nauki Polskiej*. Seria C, zeszyt 10 (1965), ss. 3-41.

KOPELEVICH Judith Ch.
1978: The beginnings of ties of the Saint Petersburg Academy of Sciences with the scholars of Gdańsk (in Polish). *Kwartalnik Historii Nauki i Techniki* 23/2, pp. 323–331. Available online: http://bazhum.muzhp.pl/media//files/Kwartalnik_Historii_Nauki_i_Techniki/Kwartalnik_Historii_Nauki_i_Techniki-r1978-t23-n2/Kwartalnik_Historii_Nauki_i_Techniki-r1978-t23-n2-s323-331/Kwartalnik_Historii_Nauki_i_Techniki-r1978-t23-n2-s323-331.pdf (retrieved: 28/12/2016).

KRAITCHIK Maurice
1953: *Mathematical Recreations*. New York: Dover Publications, Inc.

KUCHARZEWSKI Feliks
1928: Michał Jan Hube and his work on river regulation (in Polish). *Przegląd Techniczny* 42, pp. 811–816. Available online: http://bcpw.bg.pw.edu.pl/dlibra/docmetadata?id=3453&from=publication (retrieved: 28/12/2016)

KÜHN Heinrich
1746: Vernünftige Gedancken von dem Ursprung der Qvellen, und des Grund-Wassers, auch von andern damit verknüpften Sachen: den Liebhabern der Wahrheit mitgetheilet, aus der lateinischen in die deutsche Sprache übersetzet, und mit dienlichen Beysätzen vermehret, auch mit nöthigen Registern versehen. Berlin, Leipzig: Haude & Spener. Available online: http://reader.digitale-sammlungen.de/de/fs1/object/display/bsb11272058_00001.html (retrieved: 28/12/2016)
1747: Ausführliche Beschreibung einer neuen und vollkommeneren Art von Wagen, etc., *Versuche und Abhandlungen der Naturforschenden Gesellschaft in Danzig*. Erster Theil [Teil], pp. 1–76. Available online: http://echo.mpiwg-berlin.mpg.de/ECHOdocuView?url=/permanent/library/MV5541KC/index.meta (retrieved: 28/12/2016)

1753: Meditationes de quantitatibus imaginariis construendis et radicibus imaginariis exhibendis. *Novi Commentarii Academiae Scientiarum Imperialis Petropolitanae* 3, pp. 170–223. Available online: https://babel.hathitrust.org/cgi/pt?id=ucm.5324351545. See also: http://www.biodiversitylibrary.org/item/38563#page/7/mode/1up (retrieved: 28/12/2016).

1758: Der Einfluss der Mathematick und Natur-Lehre in die zeitliche Glückseeligkeit des menschlichen Geschlechtes, bei Gelegenheit der zum Andecken des vor zwey hundert Jahren gestifteten Danziger Gymnasii den 13 Junii 1758 angestellten Jubel Feyer. *Acta jubilaei secundi gymnasii Gedanensis Anno Domini LDCCLVIII die XIII. Juni solenniter celebrati*, pp. 265–284.

L'HUILLIER Simon Antoine Jean

1778: *Eléments d'arithmétique et de géométrie pour les écoles palatinales*. Varsovie.

1780: *Jeometrya dla szkół narodowych*. Cz. 1. Translated by Andrzej Gawroński (Warszawa: w Drukarni Nadworney J. K. Mci, 1780). Available online (II wyd. z 1785): Biblioteka Cyfrowa UMCS; http://dlibra.umcs.lublin.pl/dlibra/docmetadata?id=15608 (retrieved: 28/12/2016).

1781a: *Geometrya dla szkół narodowych*. Część II. Translated by Andrzej Gawroński (Warszawa: w Drukarni Nadworney J. K. Mci, 1781). Available online: Pedagogiczna Biblioteka Cyfrowa; http://pbc.up.krakow.pl/Content/1490/geometrya.djvu (retrieved: 28/12/2016).

1781b: *Arytmetyka dla szkół narodowych*. Translated by Andrzej Gawroński (Warszawa: w Drukarni Nadworney J. K. Mci, 1781): Available online: http://www.dbc.wroc.pl/Content/25763/index.djvu.

1782: *Algiebra dla szkół narodowych*. Translated by Andrzej Gawroński (Warszawa (Marywil): Michał Gröll, 1782). Available online at Pokarpacka Biblioteka Cyfrowa: http://www.pbc.rzeszow.pl/dlibra/docconten-t?id=8926 (retrieved: 28/12/2016).

1789: *Polygonométrie et abrégé d' isopérimétrie élémentaire*. Genève.

1812–1813: Géométrie. Mémoire sur la polyédrométrie; contenant une démonstration directe du théorème d'Euler sur les polyèdres, et un examen des diverses exceptions auxquelles ce théorème est assujetti (Extracted by M. Gergonne). *Annales de Mathématiques Pures et Appliquées 3*, pp. 169–189. Available online: http://archive.numdam.org/ARCHIVE/AMPA/AMPA_1812-1813__3_/AMPA_1812-1813__3__169_0/AMPA_1812-1813__3__169_0.pdf (retrieved: 28/12/2016).

LINDE M. Samuel Bogumił

1814: *Słownik języka polskiego*. T. 6: U–Z. Warszawa: M. Samuel Bogumił Linde i Drukarnia XX. Piiarów. Availabile online at *Kujawsko-Pomorska Biblioteka Cyfrowa:* http://kpbc.umk.pl/dlibra/docmetadata?id=13054 (retrieved: 28/12/2016).

MEMIN ENCYCLOPEDIA
2016: Vincetoxicum. Available online: http://memim.com/vincetoxicum.html (retrieved: 28/12/2016).

MROZOWSKA Kamilla
1961: *Szkoła Rycerska Stanisława Augusta Poniatowskiego* (1765–1794). Wrocław – Warszawa – Kraków: Zakład Narodowy Imienia Ossolińskich Wydawnictwo Polskiej Akademii Nauk. Komitet Nauk Pedagogicznych i Psychologicznych Polskiej Akademii Nauk. „Monografie Pedagogiczne" VIII. Pod Redakcją Bogdana Suchodolskiego.
1962–1964: Hube Jan Michał (1737–1807). *Polski Słownik Biograficzny*, vol. 10, ss. 67–69.
1980: Pfleiderer Christian (1736–1821). *Polski Słownik Biograficzny,* vol. 25, ss. 763–764.

ODLANICKI-POCZOBUTT Marcin
1802: Letter to Nicolaus Fuss (Wilno, May 5, 1802). Preserved in the Manuscripts and Rare Books Department of the University of Tartu Library. Available online at the University of Tartu Library, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/13980/odlanickipoczobutt.pdf (retrieved: 28/12/2016).

PFLEIDERER Christoph Friedrich
1782: Prorector Academiae Eberhardinae Carolinae L. S. Available online at The Eberhard Karls Universität Tübingen Universitätsbibliothek: http://idb.ub.uni-tuebingen.de/cgi-bin/digi-downloadPdf-hpdfimage.fcgi?projectname=LXV8_fol_81 (retrieved: 28/12/2016).
1792: Letter to Johann Albrecht Euler (Tübingen, January 12, 1792). Preserved in the Manuscript Department of the University Library of Tartu. Available online at the University Library of Tartu, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/12018/pfleiderer.pdf (retrieved: 28/12/2016).

PINTEREST
2016: Leonhard Euler. Available online: https://www.pinterest.com/eulerstalker/leonhard-euler/ (retrieved: 28/12/2016).

PRZYTYCKI Józef Henryk
2007: *KNOTS: From combinatorics of knot diagrams to the combinatorial topology based on knots*. Chapter II: *History of Knot Theory*. Cambridge University Press, pp. 600, accepted for publication, e-print: http://arxiv.org/abs/math/0703096 (retrieved: 28/12/2016).

2010: *From Goeritz matrices to quasi-alternating links*; A Book Chapter (Chapter 9) in *The Mathematics of Knots: Theory and Applications*, M. Banagl, D. Vogel, editors; Springer- Verlag, 2010, pp. 257–315. ISBN 3-642-15636-3; e-print: http://front.math.ucdavis.edu/0909.1118 (retrieved: 28/12/2016).
2016: *Knot Theory and related with knots distributive structures. Gdańsk Lectures* (in Polish). Gdańsk: Gdańsk University Press, pp. 188. Second extended edition. ISBN 978-83-7865-330-1.

RICHESON David S.
2008: *Euler's Gem. The Polyhedral Formula and the Birth of Topology*. Princeton and Oxford: Princeton University Press. ISBN 978-0-691-12677-7.

SANDIFER C. Edward
2007: The *Early Mathematics of Leonhard Euler*. Washington, D.C.: MAA Spectrum, Mathematical Association of America. ISBN 978-0-88385-559-1.

SCHUBRING Gert
2006: *Conflicts Between Generalization, Rigor, and Intuition: Number Concepts: Number Concepts Underlying the Development of Analysis in 17th-19th Century France and Germany*. New York, USA: Springer Science & Business Media. ISBN-10: 0-387-22836-5; ISBN-13: 978-0387-22836-5."Sources and Studies in the History of Mathematics and Physical Sciences". Available online: https://books.google.pl/books?id=rMWe3okqPOcC (retrieved: 28/12/2016).

SMIRNOV Vladimir Ivanoich, JUŠKEVIČ Adol'f Pavlovich (eds.)
1967: *Leonard Eiler; perepiska. Annotirovannyi ukazatel'*. Institut istorii estestvoznaniia i tekhniki (Akademiia nauk SSSR). Leningrad: Nauka, Leningradskoe otd-nie.

ŚNIADECKI Jan
1814a: *Pisma rozmaite*, vol. 1. Wilno – Warszawa: Nakładem i Drukiem Józefa Zawadzkiego, Typografa Uniwersytetu. Available online: http://ebuw.uw.edu.pl/Content/2090/directory.djvu (retrieved: 28/12/2016).
1814b: *Pisma rozmaite*, vol. 2. Wilno – Warszawa: Nakładem i Drukiem Józefa Zawadzkiego, Typografa Uniwersytetu. Available online: http://ebuw.uw.edu.pl/Content/2091/directory.djvu (retrieved: 28/12/2016).
1815: Letter to Nicolaus Fuss (Wilno, January 17, 1815). Preserved in the Manuscript Department of the University Library of Tartu. Available online at the University Library of Tartu, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/12115/sniadecki1.pdf (retrieved: 28/12/2016).

THORNISCHE WÖHENTLICHE NACHRICHTEN UND ANZEIGEN NEBST EINEM ANHANGE VON GELEHRTEN SACHEN
1766: Euler's visit in Warsaw (3 VII, 1766, p. 210). Available online at Kujawsko-Pomorska Biblioteka Cyfrowa: http://kpbc.umk.pl/publication/30619 (retrieved: 28/12/2016).

TITIUS (TIETZ) Johann Daniel
1752: *Dissertatio Inauguralis, Luminis lunaris theoria nova, argumentis CL. Euleri superstructa*. Leipzig: Gabriel Büschel. Available online: https://books.google.pl/books?id=XDsNs7e5zcIC (retrieved: 28/12/2016).
1763: *Die gänzliche Ergebung der Lande Preussen an Polen, mittelst des A. 1466, nach der Einnahme von Comitz, zwischen König Casimir dem IV und dem Hochmeister Ludwig von Ehrlichshausen geschlossenen Friedens, historisch vorgestellet*. Wittenberg.

WIESE Ludwig Adolf
1864: *Das Höhere Schulwesen in Preussen. Historisch-statistische Darstellung*, Verlag von Wiegandt und Grieben, Berlin, 1864. Available online: http://reader.digitale-sammlungen.de/de/f1/object/display/bsb10735613_00005.html (retrieved: 28/12/2016).

WIKIPEDIA
2016: Finow Canal. Available online: https://de.wikipedia.org/wiki/Finowkanal (retrieved: 28/12/2016).

WILSON Robin J.
2012: *Introduction to Graph Theory*, 5th Ed. Upper Saddle River, New Jersey: Pearson. ISBN 978-0-27-372889-4.

WOLF Nathanael Matthaeus, von
1767: Letter to Johann Albrecht Euler (Gdańsk, March 8, 1767). Preserved in the Manuscript Department of the University Library of Tartu. Available online at the Library of Tartu, DSpace Repository: http://dspace.ut.ee/bitstream/handle/10062/14058/wolf3.pdf (retrieved: 28/12/2016).