Part III

HISTORY OF SCIENCE IN GDAŃSK

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23. Gdańsk Scientists at the Royal Society

The famous Royal Society was founded in 1660 in London. The official name (the Royal Society) has been used since the first statutes were adopted on 15 July 1662. The name of the institution was soon expanded to include the Royal Society of London for Promoting Natural Knowledge. When approving the second statutes on 23 April 1663, King Charles II presented the Society with the insignia comprising a sceptre with the coats of arms of England, Ireland, Scotland and France. In May of that year, the Society already had as many as 150 fellows -today there are 1450 fellows, including 80 Nobel prize winners! The Society had also scientists from Gdańsk as its fellows.

The first location of the Society in London was the Gresham College, established in 1579, the second – as of 1710 - the so-called Crane Court on Fleet Street – existing no longer. In 1780 it moved to the Somerset House on the Strand, and in 1857 - to the Burlington Palace on Piccadilly, the main building of which is currently housing the Royal Academy of Arts, which was erected in 1665 by Richard Boyle, the First Earl of Burlington. In the years 1868-1874, the building was exten-ded by new wings, where the Astronomical, Geological, Linnaeus, Antiquarian,

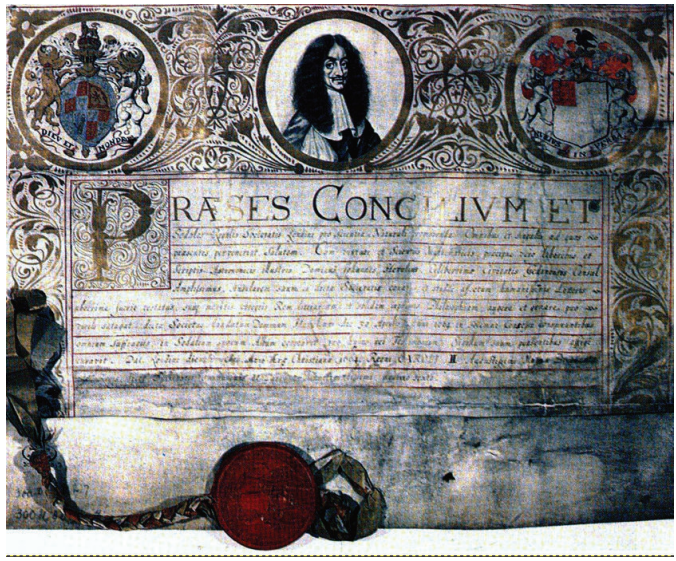

Figure 49. Hevelius's fellowship diploma at the exhibition at the Historical Museum of the City of Gdańsk (Photo: Januszajtis A.)

Chemical Societies as well as the British Academy found their locations. The current address of the Royal Society (since 1967) is Carlton House Terrace Nos. 6-9. This is also the site where the library is located. The magnificent collections comprise more than 150 000 volumes, numerous busts and portraits, Newton's telescope, Humphrey Davy's mining lamp and many more. Minutes of all meetings, including those attended by Gdańsk scientists can be found in the archives.

On 1 January 1662 the Governor of Connecticut, John Winthrop became the first foreign fellow, the second was the brilliant Dutch physicist Christiaan Huygens, two Frenchmen followed. The fifth fellow to be accepted was the "astronomer from Gdańsk", Johannes Hevelius [Fig. 50].

Jan Heweliusz (Johannes Hevelius). Hevelius (who has been described in detail above) was an active fellow of the Royal Society, and corresponded with its secretary Henry Oldenburg and other prominent fellows. The results of his observations were printed in the Society's Philosophical Transactions, published from 1665 until today. When the belligerent Robert Hooke tried to undermine their reliability, the Society, at the request of the offended Hevelius, sent Edmond Halley to Gdańsk, who confirmed the accuracy of the Gdańsk astronomer's observations. The whole matter was noted in the Philosophical Transactions. It should be also remembered that Hevelius sent to England his portrait by Andrzej Stech, which is currently stored in Oxford.

When mentioning Hevelius, we should remember his wife, Elisabeth Koopman, about whom we have already written that she assisted her husband in his observatory, edited and published her husband's works after the astronomer's death,

including such valuable titles as *Prodromus Astronomiae*, with the above mentioned positions of stars, and *Firmamentum Sobiescianum*. She was not a member of the Royal Society, but she corresponded with its secretary and with some of its fellows. In 1686, Edmond Halley himself bought fabric for a dress in London at her request.

Johann Philipp Breyn. The next fellow of the Royal Society from Gdańsk, admitted on 21 April 1703, was Johannes Philippus Breynius, i.e. Johann Philipp Breyn. Born in Gdańsk on 5 August 1680, he was a son of a well-known merchant and scientist Jacob Breyn, from whom he inherited his enthusiasm for botany. Having graduated from the Academic Gymnasium, he studied medicine in Leiden, then travelled across Western and Southern Europe. He stayed in London and Oxford for the longest time. Having returned to Gdańsk, he practiced as a physician. Following his father's example, he established a botanical garden in Brabank (Stara Stocznia Street), later No. 7. Contacts established abroad helped him acquire exotic plants. According to an inventory taken at a later time the plants growing in his garden included, pineapples (118 plants!), fig trees, coffee plants and oleanders as well as acacia trees, a pomegranate tree, a camphor tree from Japan and a cinnamon tree from Ceylon as well as many medicinal plants. He also collected mineralogical objects, including amber, and paleontological artefacts. In his house at 30 Długa Street he had a huge library and a numismatic collection. He was also a member of the French Academy, the German "Leopoldine" and the first scientific societies in Gdańsk. He died on 12 December 1764. His collection was sold to St. Petersburg. Breyn's publications include a monograph on the Polish cochineal– a beetle from which a red dye for fabrics was obtained - and an album of South African flora based on his father's collections, which was re-issued in 1978 [Fig. 51].]The next fellow of the Royal Society from Gdańsk, admitted on 21 April 1703, was Johannes Philippus Breynius, i.e. **Johann Philipp Breyn**. Born in Gdańsk on 5 August 1680, he was a son of a well-known merchant and scientist Jacob Breyn, from whom he inherited his enthusiasm for botany. Having graduated from the Academic Gymnasium, he studied medicine in Leiden, then travelled across Western and Southern Europe. He stayed in London and Oxford for the longest time. Having returned to Gdańsk, he practiced as a physician. Following his father's example, he established a botanical garden in Brabank (Stara Stocznia Street), later No. 7. Contacts established abroad helped him acquire exotic plants. According to an inventory taken at a later time the plants growing in his garden included, pineapples (118 plants!), fig trees, coffee plants and oleanders as well as acacia trees, a pomegranate tree, a camphor tree from Japan and a cinnamon tree from Ceylon as well as many medicinal plants. He also collected mineralogical objects, including amber, and paleontological artefacts. In his house at 30 Długa Street he had a huge library and a numismatic collection. He was also a member of the French Academy, the German "Leopoldine" and the first scientific societies in Gdańsk. He died on 12 December 1764. His collection was sold to St. Petersburg. Breyn's publications include a monograph

on the Polish cochineal– a beetle from which a red dye for fabrics was obtained - and an album of South African flora based on his father's collections, which was re-issued in 1978 [Fig. 51].

Daniel Gabriel Fahrenheit. Another member on the list of the Royal Society from Gdańsk, Daniel Gabriel Fahrenheit, has been described extensively elsewhere. It is his relations with the Royal Society only that will be mentioned in this section. It follows from the minutes kept at the Royal Society of London that "Mr. Fahrenheit, a gentleman from Gdańsk", attended a meeting on 5 March 1723 for the first time. We read, *inter alia* (in contemporary English): "Mr. Fahrenheit showed an interesting small double thermometer of his own invention; about 4 inches long with two tubes, one filled with mercury and the other with wine spirit, which were attached to a silver frame and adapted to a single scale designed in such a way that they should be placed at the same level and rise and fall identically. The same gentleman also presented a paper in Latin containing experiments in which he tested various liquids in order to find their boiling points. He used a mercury thermometer, prompted by the observation that mercury in the barometer reacted to temperature as well as the weight of air, and the desire to see if water and other liquids could have a higher temperature than the temperature sufficient for boiling." Making a double mercury and spirit thermometer with one scale would be considered proof of true mastery even today!

Figure 50. Breyn's drawing from *Flora Capensis* (original in the Gdańsk Library of the Polish Academy of Sciences)

Fahrenheit was in London for the second time in 1724. On 26 March he presented "one of his mercury thermometers, which he has made to test various temperatures of liquids when they begin to boil, according to a report presented to the Society about 3 weeks ago. He also showed a thermometer used by him

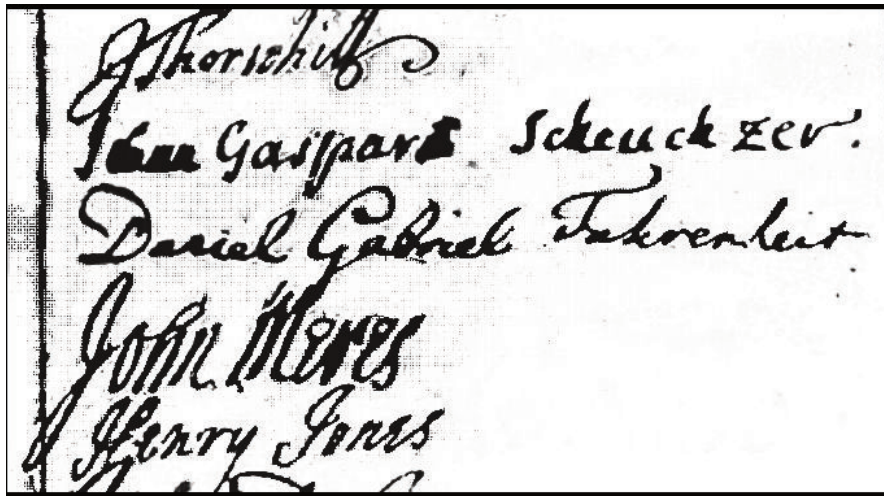

Figure 51. Fahrenheit's signature on the list of new fellows (collections of the Royal Society)

to find the temperature of air. He also presented a paper containing a table of specific weights of thirty substances ..." . And on 2 April "he presented a message about the experiments conducted by him on the freezing of water in vacuum ..." In the next report of 30 April, we find supplementary information that Fahrenheit investigated a metal contained in the gold ore (platinum), namely that it was "heavier than pure gold". Eventually, on 7 May 1724, it was recorded that "Mr. Scheuchzer Jun., Mr. Lister and Mr. Fahrenheit were put to a vote and elected fellows of the Royal Society" [Fig. 52]. Each of them read and signed the Obligation of the Fellowship of the Royal Society reading as follows: 'We who have hereunto subscribed, do hereby promise, that we will endeavour to promote the good of the Royal Society of London for Improving Natural Knowledge, and to pursue the ends for which the same was founded; that we will carry out, as far as we are able, those actions requested of us in the name of the Council; and that we will observe the Statutes and Standing Orders of the said Society. Provided that, whensoever any of us shall signify to the President under our hands, that we desire to withdraw from the Society, we shall be free from this Obligation for the future.'

In 1726, five treatises written by Fahrenheit were published in Philosophical Transactions: 1. *Experiments concerning the Degrees of Heat of boiling Liquors;*

2. *Experiments and observations on the freezing water in vacuo*; 3. *Specific gravity of some substances tested at different times for different purposes.* 4. *Description and application of a new hydrometer* and 5. *Description of a new barometer*. Each of these has contributed something new to the history of physics.

Jacob Theodor Klein. The fourth scientist from Gdańsk to become a fellow of the Society was Jacob Theodor Klein [Fig. 53]. Born on 15 August 1685 in Königsberg, he studied law, history and mathematics at the university there, and then took a research trip across Europe. From 1712, he lived in Gdańsk,

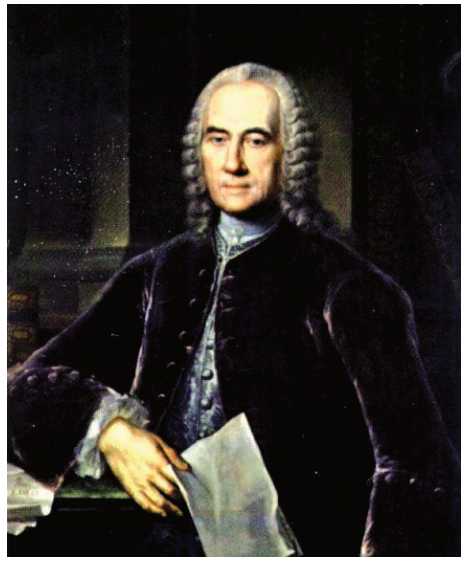

Figure 52. Jacob Theodor Klein (Wessel J., 1759)

where he became secretary of the City Council. Having learnt Polish, he served as the city representative at the court of August II.

Business trips to other countries were used by him to build a collection of plants, insects and animals. In 1718, he founded a botanical garden in Gdańsk at Długie Ogrody (Long Gardens) Street, where he grew exotic plants, including the flowering (!) *Coffea.* He was a precursor of research on the fauna of the Baltic Sea. He developed his own zoological systematics, different from that of Linnaeus, which, however, was not adopted. Similarly to Breyn, he was a fellow of the Gdańsk Academic Society (Societas Litteraria), founded in 1720 as the first scientific society in Poland, and after its decline, he founded, with his friends, the Society of Experimental Physics (Societas Physicae Experimentalis) at the turn of 1742/1743, better known as the Natural Society (Naturforschende Gesellschaft), of which he became secretary and director in 1746. Earlier, on 7 March 1729, he was admitted to the Royal Society. Later the same was done by the Bologna Academy (1748), Deutsche Gesellschaft in Jena (1755) and the St. Petersburg Academy of Sciences (1756). Jacob Theodor Klein left 80 works out of which we will mention the *Natural History of Fish* (*Historia piscium naturalis*) published in 1740-1749 and the *Herald of the History of Birds* (*Historiae avium prodromus*) published in 1750, in which he classified and described previously unknown species. He was married three times and had three daughters, of which the youngest - Juliana Renata - became the wife of Daniel Gralath the Elder. Jacob Theodor Klein died in Gdańsk on 27 February 1759. The book collection left by him, including three thousand volumes went to the Gralath library, the core of which has been preserved to this day in the Gdańsk Library (Polish Academy of Sciences).

Forsters. The fellows of the Royal Society of London related to Gdańsk and the Gdańsk Pomerania region were also the naturalists, Johann Reinhold Forster - admitted on 27 February 1772 - and his son Johann Georg Adam Forster - admitted on 9 January 1777 [Fig. 54].

They should be discussed together as their major achievements were shared. Scottish, German and Polish blood flowed in their veins. **Johann Reinhold Forster**, born on 22 October 1729 in Tczew (Dirschau), son of the mayor, received thorough education, with specific emphasis laid on languages. At home, he was allowed to speak with his father in Latin, and with mother in Polish only. Having graduated from a Latin school, he was sent to a gymnasium in Berlin, and then to study theology in Halle, where he devoted most of his time to study natural sciences and learn languages of which he mastered seventeen. Having not completed his studies, he returned home to become a preacher at St. Peter's Church in Gdańsk. In 1753 he settled in Mokry Dwór (Nassenhuben) near Gdańsk as the preacher of a private chapel of the Schwartzwald family. A year later, he married his cousin Justine Elisabeth Nicolai at St. Peter's Church, with whom he had seven children. In his spare time, he studied mathematics, philosophy, foreign languages and customs of the Eastern nations.

Figure 53. Johann Reinhold Forster and Johann Georg Adam Forster (Rigaud J.F.)

On 27 November 1754, his son **Johann Georg Adam Forster** was born. He was not sent to school by his father who educated him himself. He was helped by 2500 books from his collection. With the hope of improving his life, in 1765 he accepted an invitation to travel to Russia to investigate the life of the Volga colonists. He took his son with him. The report was not liked by the tsarist authorities and the Forsters, deprived of the means of living, moved to England.

They were bad off, Georg gave up education and went for a trading business. He would earn some money with English translations – including the works of Lomonosov. In 1771, the researchers who were supposed to participate in Cook's second expedition refused to go and their places were offered to the Forsters, "to collect, describe and draw the specimens of nature that they will encounter during the expedition". During the expedition, in the years 1772-1775, they gathered a large collection of specimens of fauna, flora, minerals and objects of material culture, especially from Australia and Oceania. Their description of the expedition entitled *A Voyage Round the World*, which also had Polish editions, is a fascinating reading to this day. Here is, for example, an excerpt from the report from the Social Islands: "It was one of those beautiful mornings which the poets of all nations have attempted to describe, when we saw the isle of O-Taheite, within two miles before us. The east-wind which had carried us so far, was entirely vanished, and a faint breeze only wafted a delicious perfume from the land, and curled the surface of the sea. The mountains, clothed with forests, rose majestic in various spiry forms, on which we already perceived the light of the rising sun: nearer to the eye a lower range of hills, easier of ascent, appeared, wooded like the former, and coloured with several pleasing hues of green, soberly mixed with autumnal browns".

Having returned from the expedition, Forster junior lectured at various universities, including Vilnius for three years. Later he moved to Germany and at the time of the Great French Revolution he called for the annexation of the Rhineland to France. Overwhelmed by the new ideas, he left for Paris, where he fell ill and died on the hands of his Polish friends on 10 November 1794, at the age of just 40. His father, professor in Halle from 1780, died on 9 December 1798. Both Forsters, Polish citizens by birth, citizens of the world by their doings, have deserved a prominent place among those who are our pride.

Nathanael Matthäus Wolf. Born on 26 January 1724 in Chojnice (Konitz), he carved out a brilliant career [Fig. 55]. Having graduated from the Academic Gymnasium and having studied in Leipzig, Halle and Erfurt where he received a scholarship from Adam Stanisław Grabowski, the bishop of Warmia (Ermland), he settled in Warsaw. For some time he was a town physician in his hometown. He was the court medic of the Czartoryski and Lubomirski families and a medic of the famous School of Chivalry founded by King Stanisław August in Warsaw. The king himself valued him greatly and ennobled him, in recognition for his achievements. Doctor Wolf accompanied Prince Adam Czartoryski (incidentally, born in Gdańsk) on his trip to Turkey, Germany, France and England. Having returned to Poland, he settled in Tczew (Dirschau), and when the town had been seized by the Prussians during the First Partition, he moved to Gdańsk which was still Polish. Here "he soon gained a wide practice, which, however, did not completely distract him from his passion for astronomy and scientific research similar to medical knowledge." This is what Johann Bernoulli, a well-known traveller, also an astronomer himself, wrote about him. "I went to see Dr. Wolf, who lives

at Targ Drzewny in the house of the Abbot of Oliva, on the upper floor. With great pleasure and curiosity I looked at his beautiful astronomical and extremely convenient device with which he managed to create a small comfortable observatory next to his study" (1777). The description of this observatory along with the results of observations has been preserved in foreign journals, *inter alia,* in the Philosophical Transactions of the Royal Society of London, of which he was a fellow from 10 April 1777. Wolf also actively participated in the works of the Gdańsk Natural Society. In 1781, at his own expense, he built an observatory at Biskupia Górka (Bischofsberg), on a plot of land acquired through the intercession of Aleksy Husarzewski, the last royal commissioner in Gdańsk. The establishment was supported by the Czartoryski and Lubomirski families. A detailed description of the observatory can be found in the *History of the Natural Society* (*Geschichte der Naturforschenden Gesellschaft in Danzig*) by Eduard Schumann, published in 1893 [Fig. 56]. In his will, Wolf bequeathed four thousand ducats for the maintenance of the establishment and the astronomer's salary which was to be administered by the Natural Society. Doctor Wolf was also the creator of original natural systematics, which, however, would not be adopted. He donated his herbarium comprising 40 volumes with five thousand specimens, and a rich collection of shells and minerals to the Natural Society. Before the last war, these collections formed the core of the Natural History Museum in the Green Gate (Zielona Brama). A fragment of the herbarium only has survived to this day.

Figure 54. Nathanael Matthäus Wolf

Doctor Wolf died on 15 December 1784. He was buried near the observatory on Biskupia Górka. The funeral speech delivered by Dr. Lampe was printed and sent to King Stanisław August. On the 10th anniversary of his death, a plaque

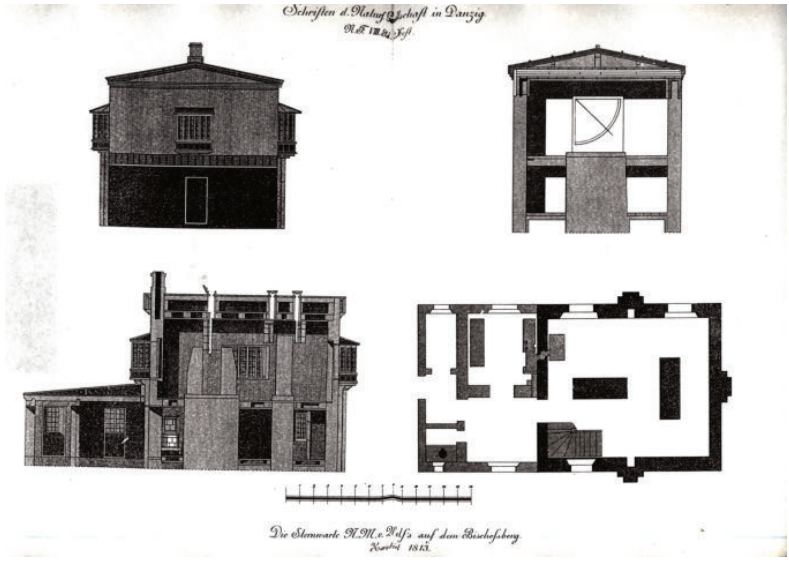

Figure 55. Wolf's Observatory

with the following Latin inscription was placed on the tomb (abbreviations are deciphered in parentheses): "Here lies Nat(haneael) Mat(thäus) von Wolf, founder of the astron(omic) observatory, in the place he chose for himself, the monument to the most distinguished man was founded by memb(ers) of the Gd(ańsk) Soc(iety) of Res(earchers) of Nat(ure) asking that Urania (astronomy) should persevere". The plaque, renovated in 1884, still existed after the last war; attempts to find what happened to it later have been unsuccessful. In 1813, facing the presence of Russian troops besieging Gdańsk, the observatory was demolished, for which the Society later received a compensation of 4621 thalers. The new observatory in Gdańsk was established as late as in 1867 in the Naturalists' House - the new seat of the Society at 26 Mariacka Street (the Archaeological Museum today). At that time, a beautiful tented roof, dating back to the times of Antonis van Obberghen, was dismantled to be replaced with a characteristic observation dome, known from pre-war photographs. During the reconstruction of the Naturalists' House, the Renaissance tented roof from 1599 was restored.

Wolf's contributions were also great in the field of medicine. He was the first in Gdańsk (and probably in Poland) to vaccinate children and adults against smallpox from 1776. An excellent description of such vaccination can be found in Joahnna Schopenhauer's memories of the youth in Gdańsk.

Let us finish this sketch by repeating the question which I asked almost half a century ago in the magazine *Litery* (*Letters)*: I wonder, if there is any trace of the remarkable and familiar personality of Doctor Wolf on Biskupia Górka? As far as I know, no one has answered this question yet.

Adolf Friedrich Johann Butenandt. The last of the fellows of the Royal Society of London associated with Gdańsk was the biochemist **Adolf Friedrich**

Johann Butenandt who was admitted on 25 April 1968 [Fig. 57]. He was born on 24 March 1903 in Lehe (now Wesermünde) near Bremerhaven. Having studied chemistry in Marburg, he received his Ph.D. degree in 1927 in Göttingen in the field of knowledge about insecticidal compounds under the supervision of the Nobel Prize winner Adolf Windaus. It was also there where he began research on sex hormones which was culminated in isolation of the crystalline estrone from the urine of pregnant women in 1929. He isolated the male hormone – androsterone in a similar manner in 1931. In 1933 he became professor and director of the Department of Organic Chemistry at the Faculty of Chemistry at the Gdańsk University of Technology. When studying the molecular structure of the androsterone, he discovered its analogy to the cholesterol structure. It was also here that he synthesized one more hormone - testosterone – after he had isolated it in 1935. In 1939 he was awarded the Nobel Prize for these achievements together with Leopold Ruzicka, who conducted similar research. At that time (1936-1945) Butenandt was already the director of the Emperor Wilhelm Institute of Biochemistry in Berlin and the Nazi authorities did not allow him to accept the prize. He received it as late as in 1949.

Figure 56. Adolf Butenandt, Nobel Prize winner, fellow of the Royal Society

During the war, his studies included, but were not limited to, the influence of genes on the resistance to illnesses. His later achievements worth mentioning include crystallization of the insect hormone ecdysone and its similarity to cholesterol, and research on pheromones. After the war, he remained professor of physiological chemistry at the same institute, moved to Tübingen, bearing the name of Max Planck from 1948. As of 1956 he was professor and director of the Institute of Physiological Chemistry in Munich, as of 1960 - president

of the Max Planck Society (the equivalent of the Academy of Sciences). He retired in 1972. He was an honorary member of many societies and academies, received numerous international distinctions, *inter alia,* he was a Knight of the French Legion of Honour. He received honorary doctorates at six universities. The Gdańsk University of Technology joined them in 1994 on the 90th anniversary, awarding an honorary doctorate to its former professor. Adolf Butenandt died on 18 January 1995.

As can be seen, this famous Society - the English equivalent of the Academy of Sciences - has honoured at least eight world-class scientists associated with Gdańsk (even for a short time) with its fellowship. Two of them – Hevelius and Fahrenheit - were honoured in Gdańsk with monuments and plaques, and they are patrons of courtyards of the Main Building of the University of Technology. The others are still waiting to be honoured according to their merit.

24. Scientific Societies

The first attempt to establish a scientific society in Gdańsk was made by the above mentioned **Israel Conradt** (1634-1715) - a physician who was also interested in physics. Responding to the appeal of the Royal Society of London communicated to him, probably through their Gdańsk fellow Jan Hevelius, he undertook research on the influence of low temperature on the physical state of bodies, and on 3-5 February 1670, he delivered a series of lectures on the nature and effect of cold, published in Oliva seven years later [Fig. 58]. The text includes, *inter alia*, a description of the phenomenon of liquid supercooling discovered by Conradt. "Water from fragrant herbs with some portion of French wine spirits added (...) and kept for quite a long time in a cold room in a well-covered dish, so that it should not freeze; at another time (...) in the same room I poured water from a glass bottle into another glass bottle (...) and suddenly, as if in an instant, approximately a fourth or fifth part of the whole was frozen into pieces of ice floating in the remaining liquid, which however, soon afterwards melted again on their own." Elsewhere we read: "I often wonder how all those acquisitions that we bring back from scientific expeditions to foreign countries after many hardships and costs get lost in the privacy of one's home. By hiding these objects in private homes and chests, we delay the public benefit to be derived from them and inhibit the development of science and the truth inherent therein." Following this, he proposed to establish a society similar to the Italian academies, to which all enthusiasts of the Gdańsk science would belong. At the meetings, participants were to present their own works and discoveries as well as other most significant foreign achievements.

Conradt's efforts were at that time unsuccessful. The first Scientific Society in Gdańsk (and in Poland), called *Societas Litteraria*, i.e. Scientific (not "Literary"!) Society was established half a century later, in 1720, on the initiative of the eminent historian Gottfried Lengnich (1689-1774). It was organized


ISRAELIS CONRADI
Med. Doct.
DISSERTATIO
MEDICO-PHYSICA
DE
FRIGORIS
NATURA ET EFFE-
CTIBUS.
Typis & Sumptibus
MONASTERII OLIVENSIS S. Ord. Cist.
ANNO M DC LXXVII.

Figure 57. Conradt's dissertation

within in a modern organizational framework manifested in the statutes, minutes of meetings and membership fees. The number of members did not exceed a dozen, including nine real members. The objective of the Society was "to build and satisfy the mind not only by true and pleasant stimulation, but also to discuss and develop on this occasion one or another useful and sometimes interesting matter, from history and law, morality, physics, mathematics, literature and other sciences (however, it was not considered good to raise any controversial theological issues)". As can be seen, the statutes also provided for physical issues. Two main trends clashed in the Society's activities - moral and natural. Much time during the meetings was devoted to issues related to the Polish system. In 1727, the Scientific Society ceased to operate for unclear reasons.

24.1. Society of Experimental Physics (Natural Society)

The need to have its organization must have been a strong concern for the scientific community in Gdańsk, because already 15 years later Daniel Gralath, a naturalist and later the mayor, begins to establish a new society, *Societas Physicae Experimentalis*, i.e. the Society of Experimental Physics, better known as the Natural Society (Naturforschende Gesellschaft). The first organizational meeting may be considered to be the private meeting held on 7 November 1742 during which Gralath put forward the initiative to form a society. At first there were five volunteers, and Adrian Söhner, a juror of the Main City, made his room available to the participants. Two weeks later, on 22 November, a meeting on the first statutes was held, and the board was elected on 20 December. The first director, as this was the terminology adopted, was a former member of the Scientific Society, Dr. David Kade. When a vacuum pump had been purchased on Wednesday, 2 January 1743, the first scientific meeting at-

tended by nine members was held. As from 1746 the seat of the society was the Green Gate (Zielona Brama) [Fig. 59]. In the first year of operation, the number of members increased to 14, and in 1793, which ended the first period of operation (Gdańsk was annexed to Prussia), the 91st ordinary member and the 39th honorary member were registered. The members came mainly from the enlightened bourgeoisie – being teachers, doctors, lawyers, clergymen and city councillors (some of them already mentioned). The founding members were: **David Kade** (1688-1763), physician and physicist; **Michael Hanow** (1695-1773) [Fig. 60], professor of the Academic Gymnasium, a versatile scientist, a pioneer in meteorology and demography, the publisher of the first popular science magazine in Poland *Explained Curiosities of Nature* (*Erlauterte Merkwürdigkeiten der Natur*) in 1736; **Heinrich Kühn** (1690-1769), professor of the Gymnasium, outstanding mathematician, a correspondent member of the Petersburg Academy of Sciences; **Daniel Gralath**, physicist; **Jacob Theodor Klein** (1685-1759), Gralath's father-in-law, former member of the Scientific Society, member of the Royal Society of London, botanist; **Adrian Söhner** (1703-1761), juror, later a long-time director of the Society; **Paweł Świetlicki** (1699-1756), clergyman, Polish language teacher at the Academic Gymnasium, pastor of St. John's Church; **Heinrich Rosenberg** (1712-1794), lawyer, royal counsellor, owner of the largest private book collection in the old Gdańsk numbering 22 000 volumes; baron **Friedrich Zorn von Plobsheim** (1711-1789), a conchologist who later looked after the Society's collections for many years. The honorary members included, *inter alia*: the aforementioned naturalist, participant of Cook's 2nd expedition, Johann Rheingold Forster of Tczew (Dirchau) and Johann Bernoulli, the outstanding Berlin astronomer of Swiss origin, as well as three patrons of science from Warsaw: Jean Dubois, chancellor Joachim Chreptowicz and count August Moszyński. An attempt to transform the Gdańsk Society into a nationwide royal scientific society in 1756 failed due to intrigues at the court of Augustus III. As from 1753, the Society also used the name Natural Society, but in Latin it was always referred to as the Society of Experimental Physics. It was the last war only that put an end to the Society's operations, although in 1943, the 200th anniversary of its existence was celebrated with a special session. At the present time, the operations are continued by the Gdańsk Natural Society (Danziger Naturforschende Gesellschaft), founded in 1994 in Lübeck.

Statutes. The earliest statutes of the Society for Experimental Physics, adopted on 2 January 1743 contained 26 sections detailing the forms and scope of operation. The Society was to be self-sufficient and self-governing. There were financial penalties for violating the statutes. Members were divided into ordinary, honorary and free. The number of ordinary members was limited to 20, later it was unlimited. Honorary members were those who "either *in statu politico*, or *in republica litteraria* (in the community of scientists and scholars) have special merits before others and can help the Society and increase its merits by their

Figure 58. Green Gate - the first seat of the Natural Society

Figure 59. Michael Hanow

recognition or exceptional knowledge". Free members could attend regular meetings, but were not required to assist with the experiments. They were divided into educated (*litterati*) and uneducated (*non litterati*), the latter paying higher entry fees. Members were elected by a simple majority of votes. The director, secretary and treasurer were elected from among the ordinary members to compose the board. The term of office was one year, with the possibility of extension.

The members of the Society were divided into classes composed of an operator and two co-operators. The task of each class was to conduct experiments and observations for a month during ordinary meetings: "The operator has the word, supervises over experiments and observes, while the co-operators (assistants) help him and prepare what the operator tells them to. When experimenting and observing, no one is allowed to interfere with their word or with their work, but has to wait until the experiment is over; on the other hand, should anyone notice that the experimenters have lost themselves in lengthiness or in such ways that the experiment cannot be performed, either completely or without unnecessary wandering, then he is allowed, with the director's approval, to express his opinion on the operation in progress, and it should seem neither scandalous, nor slighting to anyone (...), since the truth is indeed as nice to any other member as it should be to himself." In other cases, all comments and suggestions for improvement had to be submitted after the experiment was completed.

A separate section, devoted to the art of conducting discussions, cautioned members to avoid contemptuous, bitter, and inadequate statements. The director was obliged to admonish the debaters to "use appropriate words and expressions more gently while defending the truth or confirming an opinion, and, after exposing their views on the issue, reconcile as soon as possible for the triumph of the truth." Those who did not obey had to pay a fine to the treasurer. The operators had to prepare the equipment for experiments in advance to avoid unnecessary waste of time. Each member could be present at these preparations "as pleased, so that for the benefit and convenience, when his turn comes, to be more skilful; however, no one should be a hindrance to the operators in any way".

It was planned to regularly conduct the experiments described in the three-volume textbook of physics by Christian Wolff and the Leipzig journal *Acta Eruditorum*. The most interesting of them were to be repeated once more and only then new ones were to be planned.

An important point in the statutes was the provision on the regular recording of experiments and observations. When repeating someone else's experiments, the author should be mentioned. Should the results be different, they were to be described and published with special diligence. It was the secretary's job. "Howbeit, to facilitate the secretary's work, to some extent at least, the operators will tell their cooperators to describe and, after prior checking, deliver to the secretary in due time everything that is peculiar in their experiments with proper understanding and connection, nonetheless, during the experiment, the *Secretarius* will be moving the quill, thus leaving less space for errors and mistakes." The files of the Society were divided into *History*, including history, resolutions and orders, and *Ephemerides*, containing descriptions and records of experiments, and *Comments*, which included scientific dissertations. "From the discoveries contained therein, no member shall change anything, so as not to deprive the Society of the fame of having made the invention." The secretary was also supposed to prepare and ensure that the transactions approved by the Society were printed. *Hi-*

stoires et Memoires of the Paris Academy of Sciences were taken as a model for keeping the files (in German).

Each member had the right to report his own work, having written to the director prior to that. Papers from the outside were also allowed - it could be a presentation of a "machine", a drawing or an observed phenomenon. With the consent of the board, third party attendants could also participate in meetings; the secretary's consent was sufficient in urgent cases. In the event of death of any member, the secretary was obliged to prepare a short biography and list the merits and include them in the files. These files are an invaluable source of information today.

Ordinary meetings were to be held every Wednesday "from St. Michael's day until Easter from 3 to 5, and from Easter to St. Michael's day from 4 to 6 pm". The exceptions were the weeks of: Christmas, Holy Week, Easter, Pentecost and Dominic (the beginning of the fair) and when there was a holiday on Wednesday. If the operator was unable to attend a meeting, he had to excuse himself to the director of the Society and indicate the deputy who was to conduct the experiment, if none of the cooperators wished to do it.

A separate section defined the order of taking seats and taking the floor. Priority was given to the director, followed by the operators by class, the secretary, the treasurer and the cooperators. The duties of the director included ensuring that each member should act for the common good and that the actions were in compliance with the statutes. In addition to that, he was responsible for all the affairs of the Society. At the end of the year, on the basis of a list prepared by the secretary and the treasurer, he would decide to cross-out worn-out items and instruments and to enter new ones. A deputy director was provided to help. The treasurer was responsible for the condition and maintenance of the inventory. "If, during an ordinary operation, as well as in a special experiment, an instrument is damaged, the operators will not be charged, but the treasurer should attend thereto. When the operators need one or another instrument for the experiment, and the cost of obtaining it does not exceed 8 florins, the treasurer, when requested, will provide one without any questions: for a larger sum, the financial status of the Society must be consulted." Finally, the possibility of introducing changes to the statutes was discussed. The whole ends with signatures of members.

The first statutes served until 1786. Later they were revised several times, without changing the most important provisions. Major changes were introduced only in 1865, 1875 and 1938. Wednesday was the day of ordinary meetings throughout the whole period of the Society's existence.

Works in Physics *Societas Physicae Experimentalis* was established as a physical society. From the first years, the subject of research was extended to include natural science works. Here we will focus on the achievements in physics - especially those that were of a pioneering nature. The first place should be given to the works of Daniel Gralath. His *History of Electricity* was published in the first three volumes of the *Experiments and Transactions* published by the Society in 1747, 1754 and 1756, containing a detailed outline of all

the existing achievements in this field. The author modestly refers to the *Memoirs* by Charles du Fay, but his work is broader and deeper to the extent that it can be safely considered the first thorough study of the history of research on electricity in the world. An even greater achievement of Gralath were his experimental works. As we already know, he established contact with von Kleist from Kamień Pomorski (Cammin in Pommern) through Świetlicki and performed a successful experiment with his jar, later called the Leyden jar, as early as on 5 March 1746 in Gdańsk. Gralath's publications give deeper understanding of the phenomena occurring therein than the superfluous observations of Kleist and Musschenbroek. In April 1746, Gralath set up the first battery of early electric capacitors in the world. In the same year, he was the first in the world to measure the forces of electrical attraction with an electrostatic scale, thus becoming a predecessor of Cavendish and Coulomb.

The achievements of other members of the Society worth mentioning include the prototype of an analytical scale with friction wheels designed by Kühn H., which we already know. In the first volume of the Transactions, Kühn also included the theory of weight and weighing and the design of an instrument using the law of communicating vessels to measure the water drop in a river. The experiments of **Christian Sendel** (1719-1789) on electromagnetism were of a pioneering nature - at least in Poland. In the 1850s, i.e. before Benjamin Franklin, the scientist from Gdańsk succeeded at remagnetizing a magnetic needle due to strong electric discharges. The issues of interest included also: the relationship between atmospheric pressure and altitude (Micheal Hanow); hydrostatic pressure (e.g. Gralath repeated the experiment with Pascal's barrel); refraction and dispersion of light in a prism (Jacob de la Motte); capillary tubes (Beniamin Schröder); cohesion and adhesion (Sendel); thermal expansion and changes of the state of matter (Philip Lursenius); elastic and inelastic collisions (Johann Reinick), with bifilar suspension of colliding balls; free fall of bodies (Gotfryd Reyger); strength of materials (Schröder); evaporative cooling (Hanow) and many other issues. The 48 papers contained in the first three volumes of Experiments and Transactions included 30 works devoted to physical issues, including meteorology, astronomy and works of a utilitarian nature (17 of these were purely physical). Other treaties were related to botany and zoology. In 1778 another volume was published, entitled *The New Collection of Experiments and Transactions*, containing 12 works, including only two addressing physical issues. Ephraim Krüger's treaty on the free fall of bodies in water and a salt solution is worth mentioning among them.

60 works in total were published before the partitions, 32 of which were related to physics. Other achievements that should be mentioned include obtaining the seat in the Green Gate in 1746. An outstanding role in the Society was played by **Nathanael Matthäus Wolf** (1724-1784), a physician of the Chivalry School and of the Czartoryski Princes who lived in Gdańsk since 1772. His activities in the Society (from 1776) and the contributed capital led - as described

in the chapter on the Gdańsk members of the Royal Society (pp. 76 ff.) - to the establishment of the astronomical observatory in Biskupia Górka in 1781. The observatory was destroyed during the Napoleonic Wars.

The process of departing from physics was marked in all the subsequent activities of the Society. In the 19th and 20th centuries, despite a significant increase in membership, with over 200 and later 400 members, few interesting physical treatises can be found. These include works by Strehlke F. from the years 1827-1853 with, *inter alia*, the research theory of Chladni figures, experiments in the field of electroforming, daguerreotype and spectroscopy, performed and demonstrated to the public shortly when the news of their discovery or invention had reached Gdańsk. It was also the research on the surface tension of saturated steam (Kessler F.), measurement of pressure and water flow velocity in pipes (Lampe H.) and works on the history of physics (Momber A., Schumann E. and Schnaase L.) that were of some importance. The lecture of Wolf F. from Oliva about the so called atom splitting in the interwar period may be mentioned, as well.

In the years 1815-1862 six volumes of the Newest Scripts of the Natural Society in total were published in 24 issues. They contain 30 treaties, including only three on purely physical subjects, four on meteorology and four on astronomy and navigation. It is worth mentioning that in 1852 the Society organized an international competition to develop the theory of the Foucault pendulum which had been demonstrated two years earlier in Paris. The award winning work of Hansen P. of Gotha has not lost its relevance to this day. The members of the Society also published their works in Poggendorff's Annals. At that time, the honorary members of the Society were, *inter alia*, Oersted Ch., Bessel F., Encke J., Struve F., Baily F., Arago D., Humboldt A. von, Berzelius J., Pictet F. and the mentioned Hansen P.

In the years 1864-1934, 20 volumes of *Scripts of the Natural Society* were published in the so-called *New Series*. Each volume contained four journals. Physical issues were hidden deep inside.

The achievements in this period should include obtaining the location in the building on 26 Mariacka Street in 1845 [Fig. 61] (the building was called the Naturalists' House after the name of the Natural Society), on the turret of which an astronomical observatory was built in 1867, the opening of the Museum of Natural History in the Green Gate (1880) and active participation in the endeavours to establish the Gdańsk University of Technology (1904).

Who was the first. Let us now arrange a list of European natural science societies according to the date of establishment:

- Accademia dei Lincei - Rome 1603 (operated until 1651, reinstated in 1874 as Accademia Nazionale Reale dei Lincei);
- Collegium Naturae Curiosorum - Schweinfurt 1652 (in 1670 transformed into the German National Academy of Natural Sciences Leopoldina in Halle - existing to this day);
- Academia del Cimento - Florence 1657 (dissolved in 1667);

- The Royal Society - London 1660 (existing to this day);
- The Caen Scientific Society (Academie de Physique de Caen) - Caen 1662 (dissolved in 1672);
- Academie des Sciences - Paris 1666 (now within the structure of Institut de France);
- Accademia Fisico-Matematica - Rome 1677 (existed until 1698);
- Prussian Academy of Sciences - Berlin 1700 (currently the German Academy of Sciences);
- Societas Litteraria - Gdańsk 1720 (existed until 1727);
- The Saint Petersburg Academy of Sciences - Petersburg 1724 (now the Russian Academy of Sciences);
- Societas Physicae Experimentalis - Gdańsk 1742/1743 (existed until 1945, reinstated in 1994 in Lübeck).

As can be seen, the Gdańsk Society of Experimental Physics (Natural Society) was the second scientific and first natural science society in Poland and the third in the world with 'physics' in the name.

Memorabilia. The Society for Experimental Physics had an impressive scientific collection and a rich library of about 30 000 volumes (see below). The part of the collection related to natural sciences, with the second largest amber collection in the world, was the core of the collection of the Natural History Museum in the Green Gate and was destroyed or dispersed during the last war. It is worth finding and taking down what went to museums in Poland, Germany and Russia. The collection of apparatus (including Hevelius's lenses and instruments) suffered a similar fate.

Figure 60. Naturalists' House, seen from Mydlarska Street (Photo: Januszajtis A.)

138 books only from the book collection donated in 1923 to the deposit of the Main Library of the Gdańsk University of Technology survived the fire of the university. The National Museum in Gdańsk keeps a bust of Hevelius - a gift from Stanisław August to the city on the occasion of the centenary of the astronomer's death. Another gift - for the Natural Society - a golden ring with the image of the king, set in diamonds, worn by its directors during their meetings in the 19th century, has been lost without a trace. The subsequent locations of the Society: Zielona Brama (Green Gate) (1746-1829), St. James's Church in the Old Town (1832-1845) and the tenement house at Mariacka Street (1845-1945) were rebuilt from the war ruin. Today, the first hosts exhibitions, the second has been reinstated for religious purposes, and the beautiful Naturalists' House is the location of the Archaeological Museum. As I have already mentioned, it is not known whether the stone commemorating the observatory and the grave of Nathanael Matthäus Wolf have survived at Biskupia Górka (Bischofsberg). Gralath's Stone on Aleja Zwycięstwa (Victory Avenue) commemorates today, as in the past, the main founder of the Society, whose achievements are the pride of Gdańsk and the First Polish Republic. The recognition which it enjoyed is evidenced by the words of Mitzler de Kolof, a scholar from Warsaw: "What a glorious and honourable thing it is that Gdańsk, the queen of Prussian cities in the Polish Kingdom, a pearl in the Polish crown, has within its walls such a gathering of scientists, researching the secrets of nature and sharing the results of their experiments and treaties with the entire educated world. May there be more such societies in Poland to broaden the knowledge". And Alexander von Humboldt, when receiving a honorary membership granted to him by the Society on his 71st birthday (in 1841), said: "One of the most pleasant of the many joys that the fortune has given me (...) was to be able to greet again this city which, surrounded by the charms of nature, evokes great memories of the ancient civilization of the world trade, medieval arts and magnificent scientific works at the same time. Many spiritual embryos have developed here into noble flowers over the centuries. These were diligently and fruitfully cared for by the community of naturalists. On this historic coast, on the shores of an almost enclosed sea, whose most valuable product (amber) first stimulated the peoples of the South to study the shape of the North of Europe, it is a nice duty for me to express to you, my dear colleagues, my firm commitment and grateful respect".

The Book Collection of the Society. Gathered for years, the scientific collections of the Gdańsk Natural Society, including the second largest collection of amber after Königsberg, were the core of the resources of the Natural History Museum established in the Green Gate in 1880. Unfortunately most of the collections were destroyed or dispersed during the last war (some amber specimens went to the Museum of the Earth in Warsaw). The society also had a rich collection of books numbering around 30 000 volumes. In 1923 it was transferred to the Library of the Gdańsk University of Technology. How did it happen? It all started with the exhibition of items collected by two English participants in a historic expedition during James Cook's first historical voyage. The exhibits came

from the collections of the Royal Society of London. The exhibition was organized on the occasion of the 180th anniversary of the Natural Society in November 1922. It should be noted at this point that the official date of the establishment of the Society according to its members was 22 November 1742. 2 January 1743, given by many authors was the date of the first scientific meeting and the adoption of the previously prepared statutes.

Representatives of the Gdańsk authorities invited to the opening of the exhibition were shown cramped rooms of the library in the Naturalists' House on Mariacka Street, and it was then when the idea arose to return to the plan of one of the former directors of the Society, Alfred Momber, and donate the collection to the Library of the Gdańsk University of Technology. An enthusiast of the idea was Albert Pedreek, the newly appointed director of the library. Following consultations with the Committee of the Library and the Board of the Society and discussion at the general assembly on 6 December 1922, a relevant agreement was prepared with the authorities of the Free City. Here is its wording (with abbreviations):

"The following Agreement has been executed between the Natural Society of Gdańsk, represented by the Board, on the one part, and the Free City of Gdańsk, represented by the Senate, on the other part:

§1. The Natural Society shall rent the entire library inclusive of the cabinets and shelves thereof to the Free City for a period commencing as of 1 March 1923. The rental shall be extended to include future acquisitions of the Natural Society in the form of books and periodicals.

§2. The rental fee shall correspond to the initial basic wages of the employed person, including the inflation allowance (excluding allowances for wife and children) according to Group VI at the tariff applying to Group 4 and it shall be payable every six months in arrears at the location designated by the Society each time.

§3. The Rentee shall use the library in accordance with the following rules:

1. The book collection shall be placed in the rooms of the Library of the Gdańsk University of Technology, but separately, to be administered by the Head of the University Library in consultation with the Librarian and the Library Committee of the Society.

2. The Rentee agrees, as far as practicable with the resources available in accordance with Section 4 (2), to ensure that:

a) the book collection is professionally arranged and re-catalogued;

b) each book of the Society is marked with the owner's mark;

c) one copy of the new catalogue is made for the use of the Society.

3. The Rentee shall allow members of the Natural Society to freely use the rented and university book collections.

4. Subject to the approval of other authorized persons, the Rentee agrees that:

a) members of the Society can use all the requested books and periodicals of the rented book collection on the Rentee's premises without paying any separate fees;

b) the transactions of the Natural Society shall be exchanged by the University Library at the request of the Society, and the forthcoming transactions shall be added to the Society's book collection.

§4. The Rentee shall pay the amount of 200 dollars to cover the cost of transporting the book collection to and back from the Society's premises for its professional arrangement in the university rooms. All expenses shall be paid out of this sum of money. The Rentee shall be responsible for protecting the book collection during transport, as well as when arranging it at the University of Technology, and for losses, if any.

The costs of cataloguing, management on a daily basis and expanding the collection, as well as the salaries of the required personnel shall be paid by the Natural Society from its annual budget.

§5. This Agreement shall be executed for an indefinite period of time; both parties shall have the freedom to terminate it at any time giving one year's notice of termination.

Should there be any changes in the current legal and administrative relations of the Free City, or in the relations between the Free City and the University of Technology, the Natural Society shall have the right to terminate this Agreement at any time".

On behalf of the Senate of the Free City of Gdańsk the agreement was signed by its chairman Heinrich Sahm and Hermann Strunk, senator for science, culture and education, and by Hermann Stremme the director, and Wolfgang La Baume the deputy director on behalf of the Society. The agreement was executed in 1923. As director Pedreek wrote later, the incorporation of the "miraculous" library of the Natural Society was by far the most important event in the history of the library of the Gdańsk University of Technology. "It was already at the first review that it was clear what a great enrichment it was due to the earlier volumes, particularly the wonderful series of treaties by German and foreign academies and societies. More than 400 societies are involved in the exchange of treaties every year which brings rich growth of exchangeable literature, which is now at the disposal of the University of Technology". The number of periodicals alone increased by 700!

Fragmentary information only about the fate of the book collection during the war can be found. On 31 January 1945 some of the books sailed away together with the rector's files, the most valuable equipment and about 300 people on the "Deutschland" vessel. A total of 500 crates were loaded. Most of them went to in Schmalkalden in Thuringia finding shelter in the local castle. Most of what was left in Gdańsk was destroyed in a fire of the Main Building. 126 titles have survived from the Natural Society's collection. In 1947, 853 books from those taken away to Germany went to the State Library – now the University

Library - in Bremen. They were deposited by the professor of the Gdańsk University of Technology, Ernst Witt (active at the Faculty of Architecture from 1933, died in 1971). The following date was given as the period of storage: "as long as the times do not change." However, something changed, as on 10 June 1993, during the visit of the Gdańsk delegation, the Chairman of the Bremen Parliament, Dieter Klink, in the presence of the media, handed two books from this collection to the author of this book - the Chairman of the City Council at that time - describing it as "the beginning of the return to the rightful owners". These were *History of the Animals* by Konrad Gessner, (vol. IV) published in 1620 in Frankfurt, and the *Index of Plant Names* by Christian Mentzel, published in 1682 in Berlin. Both works are richly illustrated [Fig. 62]. The index includes plant names in several languages, including Polish and Lithuanian. The books bear the seals of the Gdańsk University of Technology and the Natural Society. There were real rarities among the 851 titles that remained in Bremen at that time, such as *The Natural History* by Aldrovandi (Frankfurt 1610), *Musaeum Kircherianum Bonannus* (Rome 1709) or Journals from the Travels of Mr. Nathaniel Jacob Gerlach from his hometown Gdańsk from 1727-1731. There were also original copies of the works by famous Gdańsk botanists - Jacob Theodor Klein and Jacob Breyn - as well as volumes of catalogues of monuments of architecture and art (Bau- und Kunstdenkmaler) from various regions that are missing from our library. Materials related to the Natural Society are of great value, including the earliest list of scientific apparatus compiled in 1746 by the founder the Society, Daniel Gralath, meteorological notes from the 18th and 19th centuries, library catalogues from various periods and 22 volumes of files from 1744-1832.

Figure 61. 2000 - return of the books from Bremen

The return of these works to Gdańsk was delayed by an appeal against the relevant decision of the Senate of the City of Bremen in November 1999 by the board of the reactivated Natural Society in Lübeck. In March 2000, the court overruled the lawsuit whereby in June the priceless historical and scientific treasures returned home to the specially prepared rooms of the Library of the Gdańsk University of Technology. Fortunately, the authorities of the "Gdańsk Natural Society" of Lübeck were successfully convinced that cooperation was a much better way to act for the future. Since 1998, German-Polish Meetings in the field of Science and Culture have been organized jointly with the Gdańsk Scientific Society. The papers presented during these meeting are published in the new periodicals of the Gdańsk Natural Society (Schriften der Danziger Naturforschenden Gesellschaft) 13 volumes of which have already been issued.

As can be seen, today in Gdańsk we have fewer than 1000 titles out of 30 000. There are many reasons to believe that some of the missing books, perhaps even quite a lot, may have been taken to Russia. Experience shows that it will be very difficult to get them out of there or it may be even difficult to obtain information. The Russians consider cultural treasures appropriated during the war as bounty to which they have full rights, and just to be on the safe side, they prefer not to show them to the rightful owners.

At this point, it is worth noting that the Main Library of the Gdańsk University of Technology which had 150 000 volumes in 1943, has over a million items now.

25. Scientists of the Turn of the Centuries

The scientists and scholars closer to our time to be mentioned should include the aforementioned creator of modern nature conservation, **Hugo Conwentz** (1855-1922), who was the director of the Natural History Museum in the Green Gate for many years, and professors of the Gdańsk University of Technology: mathematician **Hans Mangoldt** (1854-1925), physicists **Walter Kossel** (1888-1956) and **Carl Ramsauer** (1879-1955), and above all, the already discussed biochemist **Adolf Butenandt** (1903-1995), who won the Nobel Prize in 1939 for the synthesis of hormones carried out in Gdańsk. Here are the life histories of some of them.

Hugo Conwentz (1855-1922). Amber researcher, pioneer of nature conservation [Fig. 63]. He was born on 20 January 1855 in Święty Wojciech (St. Albrecht) near Gdańsk, in a Mennonite family. Having graduated from the St. John's Real School he studied at the universities of Göttingen and Wrocław (Breslau), where his teaching supervisor was Prof. Heinrich Göppert, a famous botanist who administered the Wrocław botanical garden. In 1876, he defended his Ph.D. thesis *Fossilized Trees from the North German Diluvium* (*Die versteinerten Hölzer aus dem norddeutschen Diluvium*). In 1879, he returned to Gdańsk, at the age of 24 only, to become the organizer and the then director of the newly established Museum of the Provinces of West Prussia in the Green Gate, which opened its

doors to visitors in the following year. It had four departments: Nature and Archaeology, History, Inventory of Architecture Monuments, and Industry. Conwentz was also involved in inventorying the provincial forest resources and was active in the Natural Society of which he was a member since 1876. The main object of his research were amber inclusions.

At this point it should be mentioned that Gdańsk, known as the world capital of amber, is the unquestionable leader in the scientific research on amber. Local amber collections began to be amassed in the second half of the 17th century. The main specialty was collecting inclusions. The famous collection of Christoff Gottwald, the city physician, was bought by Tsar Peter I. The collection of Jacob Theodor Klein went to Erlangen. The collections that became famous in the 18th century were those of Daniel Gralath the Elder, Heinrich Jacob de la Motte and Johann Scheffler, and of Johann Aycke, Georg Berendt and Franz Menge in the 19th century. The Natural History Museum established in 1879 in the Green Gate had the second largest collection of amber after Königsberg. After the war a small part of the collections went to the Museum of the Earth in Warsaw. The importance of Gdańsk as an amber research centre is evidenced by the fact that almost all the major works on this subject were written here. Their authors came from the Natural Society. 25 treatises on amber had been published by 1895. The most important works are those by the already mentioned Scheffler J. (1778), Aycke J. (1835), Menge F. (1853-883), Berendt G. (1845).

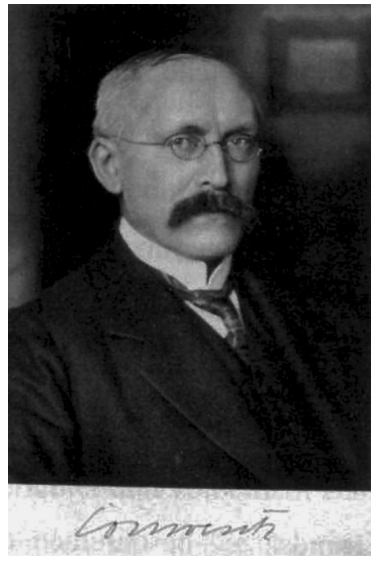

Figure 62. Hugo Conwentz (1855-1922)

The works by Hugo Conwentz published in Gdańsk: *The Flora of Amber* (*Die Flora des Bernsteins und ihre Beziehungen zur Flora der Tertiärformationen und der Gegenwart*, 1886) and the *Monograph of Baltic Amber Trees* (*Monographie*

der baltischen Bernsteinbäume, 1890) as well as articles published in the *Scripts* (*Schriften*) of the Gdańsk Society are of fundamental importance for amber research to this day. From 1890, Conwentz was a professor of botany and floristics. He also conducted archaeological research that led to many discoveries. *Inter alia,* in 1891 he described bridges over the Dzierzgonka swamps in Bągart dating back two thousand years. In 1907, owing to his efforts, an old settlement in Sopot was purchased from the city and covered by protection.

Seeing the negative impact of the rapidly growing industry on the nature, he devoted himself to its protection. His first lecture on this subject at the Natural Society was delivered in 1900. Four years later, he sent the authorities in Berlin a memorial entitled *Threats to the natural monuments and proposals for their preservation* (*Die Gefährdung der Naturdenkmäler und Vorschläge zu ihrer Erhaltung*) in which he re-formulated the concept of a natural monument, introduced by Alexander von Humboldt, and presented the principles of its protection, thus becoming its world pioneer. He promoted his ideas in different countries. The Swedish government was the first to respond by introducing legislation in the same year. In 1906 the Prussian authorities established the State Nature Conservation Centre in Gdańsk (Staatliche Stelle fur Naturdenkmalpflege) and appointed Conwentz as its Head. The initiative was becoming increasingly popular, national parks, reserves and landscape protection areas sprang like mushrooms after rain. In 1909 Conwentz was entrusted with the honour of presiding over the first session of the First International Congress for Landscape Protection in Paris. In 1910, the Gdańsk institution of nature conservation together with its director were moved to Berlin. After 30 years of administering the Museum in the Green Gate Conwentz had to say goodbye to the museum and to Gdańsk. His activity is illustrated by the figures: 477 business trips, 250 lectures (including 73 at meetings of the Natural Society, 80 at conferences for teachers), over 300 publications (11 books) on palaeontology, geology, nature conservation, forestry, etc., and textbooks for schools.

The nature conservation act law submitted to the parliament in 1912 was not adopted. The Nature Conservation organization was established after Conwentz's lectures in Prague and Brno in Bohemia. In 1915, Conwentz created a landscape protection area in Górki Wschodnie (Östlich-Neufähr) - the today's site of the Ornithological Station of the Polish Academy of Sciences. In 1919 he married Greta Ekelof of Sweden. The marriage was childless. Hugo Conwentz died on 12 May 1922 in Berlin.

A little-known fact from his life is the saving of the most valuable area of the Białowieża Forest during the First World War. In 1916, when the German army occupied the forest, the idea was to use its resources for industrial purposes. They started to build lumber mills to process timber from logging. Owing to Conwentz's efforts, a strictly protected "Nature Park" with an area of 30 km^2 was created in the forks of the Narewka and Hwoźna rivers, where logging was prohibited. Also bisons were covered by protection. It was the area of the later

Białowieża National Park. In 2009, one of the local oak trees there was named after Hugo Conwentz to commemorate this noble action. In Gdańsk, it would be a good idea to place a plaque on the house on 31 Łąkowa Street in which he lived to commemorate it.

Hans Carl Friedrich von Mangoldt. He was born in 1854 in Weimar [Fig. 64]. In the years 1872-1878 he studied mathematics and physics at the universities in Neuchatel, Göttingen, and finally in Berlin, where in 1878 he defended his PhD thesis entitled *Presentation of the roots of a three-part algebraic equation by infinite series*. In 1880 he was a private lecturer in Freiburg, in 1882 - in Göttingen. In 1884 he became full professor at the Technical University in Hannover, and in Aachen from 1886, in the years 1898-1901 he was the rector of the University of Technology there. He was nominated professor of the Gdańsk University of Technology in 1904, he was its first rector in the years 1904-1907. Let us quote a fragment of his biography by Walter Niens: "He always considered teaching as his most important task, to which he devoted all the powers of his mind throughout his life with rare fidelity and devotion". Throughout his activity, he conducted a four-semester major lecture in mathematics. Moreover, he would give various specialized lectures on the number theory, Fourier series, elementary mathematics, adjustment calculus, Maxwell's theory and many other subjects. Also in these fields he was an excellent lecturer who was able to develop and explain the most difficult problems with a rare pedagogical talent.

During the tests, he was a patient and gentle examiner, as long as it was dead knowledge that could be learned, but he made high demands on maturity and independent thinking. His scientific publications cover a wide range of issues. And so, he was interested in the application of the Riemann formula to prime numbers, problems of mercantile arithmetic, presentation of modular elliptic functions by infinite products and their extension to general functions, measurements of length and time in the theory of relativity, and he expressed his position on general problems of technology, e.g. on the views on the essence of electricity in 1905.

His standard work entitled *Introduction to higher mathematics for students and independent study* made it possible for generations of mathematicians, physicists and engineers to take the first step into academic mathematics". Let me add at this point from myself that after the last war, during my studies at the Gdańsk University of Technology, I also used this textbook and with clear conscience I can confirm the opinion of Prof. Niens: "This is the best textbook of higher mathematics I have ever had!"

In 1920, the Aachen University of Technology where von Mangoldt had once been professor and rector, honoured him with an honorary doctorate.

Hans von Mangoldt died on 27 October 1925 in his apartment in Wrzeszcz (Langfurh), currently 8 Walentynowicz Street (Hermannshöfer Weg)

Figure 63. Prof. Hans von Mangoldt

26. Pioneers of the Polish University of Technology

As the centenary of the Gdańsk University of Technology was celebrated in 2014, it is worth mentioning the Polish scientists who organized the research and teaching processes in its walls after the war. Their work was equivalent to the hardship of creating a new university. The real heroes of those hard times were the organizers of the work in individual faculties (the number and names of which would change), and the later deans – including Prof. **Marian Osiński** (Architecture), **Aleksander Rylke** (Shipbuilding), **Włodzimierz Wawryk** (Chemistry), **Karol Taylor** (Mechanics), **Kazimierz Kopecki** (Faculty of Electrical Engineering), **Karol Pomianowski** (Civil and Water Engineering) and, of course, the Rector, **Stanisław Łukasiewicz** and Vice-Rectors **Stanisław Turski** and **Edward Geisler**. In other fields, this refers to **Maksymilian Tytus Huber** (1872-1950) - author of the famous condition of plasticity and popularizer of the theory of general relativity, **Ignacy Adamczewski** (1907-2000) - the creator of the "Gdańsk school of liquid dielectrics", **Arkadiusz Piekara** (1904-1989) - an unparalleled lecturer, discoverer of nonlinear phenomena in dielectrics, **Mieczysław Wolfke** (1883-1947) - co-discoverer of two types of liquid helium and precursor of holography, who, however, was active in Gdańsk for a very short period of time, and many others who were in such great numbers that it would be impossible to include them here. A detailed description of the achievements of all those who deserve it should be the subject of a separate book. I shall limit myself to one outstanding figure whom I know best.

Ignacy Adamczewski. He was born in Warsaw on 25 January 1907 [Fig. 65]. He graduated from the Faculty of Mathematics and Physics of the University of Warsaw in 1931. The subject of his Master's Thesis supervised by professor

Czesław Białobrzewski was the Fermi–Dirac Statistics applied to the theory of electron conductivity in metals. In 1932 he started working as a research assistant in an experimental Dielectric Laboratory organized by his supervisor. The research of liquid dielectrics focused primarily on saturated hydrocarbons of the CnH2n+2 group initiated there was continued by him throughout all his life. The results of the research carried out there in 1934 bore fruit in the publications: *Ion mobility in dielectric liquids* and *Electrical conductivity of X-ray ionised dielectric liquids*. In 1936 he received his Ph.D. degree for his 111-page dissertation entitled *Ion mobility and recombination in dielectric liquids depending on fluid viscosity* in which he determined the laws relating ion mobility and recombination coefficients to ion viscosity. He also researched and interpreted the current-voltage characteristics in ionised liquids. Later, jointly with Janina Świętosławska-Ścisłowska he also measured the ion mobility in very viscous liquids. In 1937 he started his research on ion surges triggered in liquids by cosmic rays. For this purpose, he launched an X-ray plate laboratory at the Kasprowy Wierch peak, which was a novelty in those times. Until 1939 he had published eight valuable publications in Poland and abroad.

His career was interrupted by the war. After the September campaign, in which he took part, Adamczewski managed to avoid the concentration camp and death in Auschwitz, where he was imprisoned for some time. He returned to work in professor Białobrzeski's laboratory, which had to change its field of activity and started service tests for water mains and power stations. This included developing alternative energy sources in case of emergency. When the laboratory had been destroyed by Soviet bombs in 1943, Adamczewski gave lectures in underground classes and wrote *A Brief Outline of Physics for Nursing, Agricultural and Fishing Vocational Schools*. After the Warsaw Uprising, he moved with his family near Łowicz and after the front went through in 1945 – to Lodz, where he took part in establishing the University of Lodz from scratch. In July of that year he came to Gdańsk to get apparatus... and stayed. The fact that both the Gdańsk University of Technology (just transformed into a Polish university) and the newly established Gdańsk Medical Academy lacked physicists, played an important role in this decision. The official transfer was made rapidly and in August 1945 Adamczewski became Head of the Department of Physics, which in November, after another department had been opened, was ranked second at the Gdańsk University of Technology.

It was a pioneer's work to organize the teaching and research work. The wing of the main building that had housed the Department of Physics until 1904, was devastated and the most valuable apparatus had been taken away. In a short time, the rooms were cleaned, broken windows were covered, and the scattered instruments were collected. On 22 October 1945 the professor delivered the first lecture in the re-established university, which was interrupted by the unexpected entrance of the highest authorities. In the plan of the lecture, we read "22 X 45 11-13. Physics A. Arch. Eng. Inform, Introd. meas. instruments, general (President, Prime Minister)" [Fig. 66].

Figure 64. Prof. Adamczewski with Prof. Lewis J. and the author in 1968

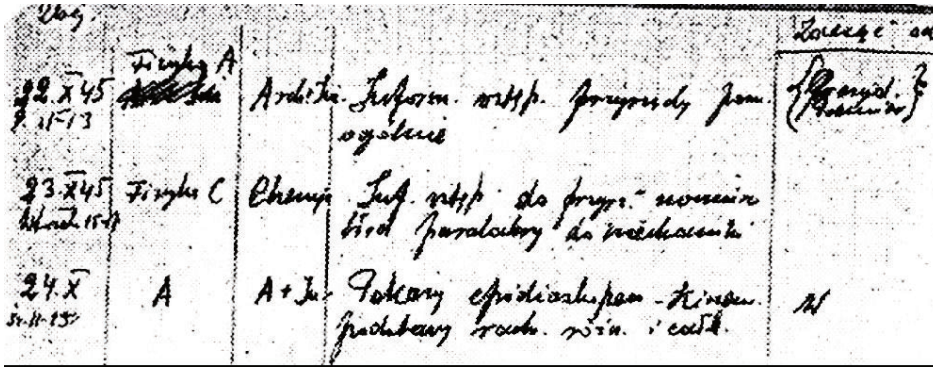

Figure 65. Prof. Adamczewski's notes from the first lectures after the war (Gdańsk University of Technology 50 years)

In December 1945 student laboratories started to operate. Assistants and, from 1947 advanced students, helped with the classes. In addition to the time-consuming teaching activities, Adamczewski, who became associate professor in 1946 and full professor in 1952, attempted to create conditions to develop research – primarily in his own field. Having recovered some of his apparatus from Warsaw and having pieced together the X-ray equipment in Gdańsk (the construction of a Van de Graff high voltage generator was commenced), he began to train staff for research work. The subject of the first master thesis under his supervision in 1948 was research on the breakdown voltage in transformer oil and cable mass. Nonetheless, in addition to engineering works, the major field of interest was the physics of liquid dielectrics, including processes of ionisation, conductivity,

and breakdown in these liquids. Detection and dosimetry of ionising radiation was another major specialty of his.

With time his research work gained extraordinary momentum. In the years 1961-1968, the professor promoted 15 PhDs. By 1969, 115 of his papers had been published, and the term "Gdańsk school of liquid dielectrics" had become commonplace abroad. The crowning achievement and summary of his achievements was Adamczewski's monograph *Ionization and Conductivity of Dielectric Liquids*, published in 1965, later translated and published in many countries.

Figure 66. 50 years of Prof. Adamczewski's research work

In the years 1953-1954 and 1965-1968 professor Adamczewski was the dean of the Faculty of Chemistry. When the Interdepartmental Institute of Physics had been established in 1968, he was its first director - until 1971, when he became professor at the University of Salford in England. One of the reasons for his leaving was the suspension of financing of the research on dielectric liquids in Poland. In England, the professor returned to intensive work, which resulted, *inter alia*, in the so-called Adamczewski's formula linking the coefficients of mobility, recombination and viscosity in liquid hydrocarbons with the temperature and number of carbon atoms in a molecule. The professor considered this formula one of his life achievements.

The professor retired in 1974, but continued to stay in Salford from time to time. In 1977 his work *Free and Quasi-Free Electrons in Non-Polar Dielectric Liquids* was released with Józef Terlecki and James H. Calderwood as co-authors. In 1983, Adamczewski celebrated the 50^{th} anniversary of his scientific work [Fig. 67]. On this occasion his former students and colleagues issued a special publication. In 1985 the Gdańsk University of Technology awarded him

an honorary doctorate. In 1991, the same was done by the second institution with which he was associated from the beginning - the Medical University. Finally, in 1994, the Gdańsk City Council awarded him with the title of Honorary Citizen of the City. He deserved it with his life and pioneering work, his research and teaching activities, reliability and integrity, high culture and ability to deal with people. He was one of the most active creators of the post-war development of the Gdańsk University of Technology, making its name famous worldwide - from the USA to Japan and Australia.

The professor was married twice. He had a son, Krzysztof with his first wife, Maria, who settled abroad. His second wife Janina was professor at the Medical University. In the last period of his life, marked by disease, in 1994, together with the writer of these words, he published the work entitled *Contribution of the Polish science to the world science in the ionization and electrical conductivity of liquid dielectrics*. Doctors did not allow him to travel to Rome in 1996 for a conference for which, also with my help, he prepared the lecture entitled *Contribution of Polish scientists to a better understanding of ionization and transport processes in dielectric liquids*. During the conference I could see again how much respect Prof. Adamczewski enjoyed among the world specialists in this field.

The progress of the disease made it impossible for him to pursue his further plans. On 23 June 2000, the professor passed away from this world. He was buried with honours in the Gdańsk Srebrzysko cemetery. The following inscription was placed on the grave: "Prof. Ignacy Adamczewski, Ph.D., 1907-2000. Honorary Citizen of the City. Ave Maria". For unknown reasons, after some years, the plaque was replaced by another on which the Honorary Citizenship was omitted.

Bibliography

[1] Abendroth Walter: Arthur Schopenhauer in Selbstzeugnissen und Bilddokumenten. Reinbek 1967
[2] Backe Hans: Rund um die Physik. Berlin, Bd. (1973)
[3] Brandstätter: Land und Leute des Landkreises Danzig. Danzig 1879
[4] Cieślak Edmund (ed.): Historia Gdańska, t. I–V. Gdańsk 1978–2000
[5] Curicke Reinhold: Der Stadt Danzig Historische Beschreibung. Amsterdam–Danzig 1687
[6] Danzig in naturwissenschaftlicher und medizinischer Beziehung. Danzig 1880
[7] Danzig und seine Bauten. Berlin 1908
[8] Danzig (Deutschlands Städtebau). Berlin–Halensee 1924
[9] Die Technische Hochschule Danzig. Berlin–Halensee 1930
[10] Drygas Aleksander: Aptekarstwo Gdańskie. Wrocław i in. 1983
[11] Faber von Bockelmann Elsa: Elisabeth Hevelius, geb. Coopmann. [in:] Weichselland 1940, 39, pp. 13–16
[12] Feldhaus Franz M.: Lexikon der Erfindungen und Entdeckungen auf den Gebieten der Naturwissenschaften und Technik. Heidelberg 1904

[13] Foltz Max: Geschichte des Danziger Stadthaushalts. Danzig 1912
[14] Januszajtis Andrzej: A Walk Around Gdansk for the Physicists. [in:] Physics in Perspective 2011, vol. 13, iss. 4, pp. 456–480
[15] Januszajtis Andrzej: Astronomy in Old Gdansk. [in:] AIP Conference Proceedings, vol. 804: Planetary Nebulae as astronomical Tools, XV. New York 2005
[16] Januszajtis Andrzej: Daniel Gralath Starszy oraz Henryk Kühn. [in:] Wybitni Pomorzanie XVIII wieku. Wrocław 1983
[17] Januszajtis Andrzej: Gdańscy pionierzy fizyki. [in:] Studia i Materiały z Dziejów Nauki Polskiej, seria C, z. 20, 1975, pp. 13–26
[18] Januszajtis Andrzej: Gdańscy pionierzy metrologii. [in:] Krajowy Kongres Metrologii. Gdańsk 1998, pp. 66–79
[19] Januszajtis Andrzej: Gdańskie zegary, dzwony, karyliony. Pelplin 2003
[20] Januszajtis Andrzej: Georg Forster – ein kritisches Lebensbild. [in:] Deutsch-polnische Begegnung zu Wissenschaft und Kultur, Bd. 8, 2005, pp. 183–194
[21] Januszajtis Andrzej: Mr. Fahrenheit, dżentelmen z Gdańska, Gdańsk 2005
[22] Januszajtis Andrzej: Od Gyddanyzc do Wielkiego Gdańska. Gdańsk 2011
[23] Januszajtis Andrzej: Profesor Ignacy Adamczewski – gdański pionier fizyki. [in:] Pionierzy Politechniki Gdańskiej. Gdańsk 2005
[24] Januszajtis Andrzej: Societas Physicae Experimentalis – pierwsze w Polsce towarzystwo fizyczne. [in:] Studia i Materiały z Dziejów Nauki Polskiej, seria C, z. 23, 1979, pp. 35–42
[25] Januszajtis Andrzej: Suma przeszłości (zarys historii PG do 1945 r.) oraz Wydział Fizyki Technicznej i Matematyki Stosowanej. [in:] Politechnika Gdańska – 50 lat. Gdańsk 1995
[26] Januszajtis Andrzej: Uczeni dawnego Gdańska. [in:] Januszajtis Andrzej (ed.): Wielka Księga Miasta Gdańska. Gdańsk 1997
[27] Januszajtis Andrzej: Wissenschaftliche Traditionen Danzigs als Brücke in die Zukunft. [in:] Deutsch-polnische Begegnung zu Wissenschaft und Kultur, Bd. 1. 1997, pp. 37–44
[28] Januszajtis Andrzej: Piotr Krüger. [in:] Zasłużeni ludzie Pomorza Nadwiślańskiego XVII wieku. Wrocław 1982
[29] Januszajtis Andrzej: Zarys historii Politechniki Gdańskiej. [in:] Politechnika Gdańska – wczoraj, dziś, jutro. Gdańsk 1994
[30] Januszajtis Andrzej: Zegar astronomiczny w Kościele Mariackim w Gdańsku. Gdańsk 1998
[31] John Wilhelm: Allgemeiner Gewerbeverein zu Danzig. Festschrift zur Feier des fünfundsiebzigjährigen Bestehens. Danzig 1903
[32] Kotarski Edmund (ed.): Gdańskie Gimnazjum Akademickie, t. I. Szkice z dziejów. Gdańsk 2008
[33] Kubik Kazimierz: Profesor Paweł Pater, pionier kształcenia technicznego w Gdańsku. [in:] Gdańskie Gimnazjum Akademickie. Gdynia 1959, pp. 79–152
[34] Mamuszka Franciszek (ed.): Gdańsk, jego dzieje i kultura. Warszawa 1969

[35] Methner Arthur: Dr. med. Johann Gabriel Schmiedt. [in:] Mitteilungen des Westpreußischen Geschichtsvereins. 32. Jg., H. 1. 1933, pp. 12–14
[36] Nägelke Hans-Dieter: Hochschulbau im Kaiserreich: Historische Architektur im Prozeß bürgerlicher Konsensbildung. Kiel 2000
[37] Perlbach Max: Pommmerellisches Urkundenbuch. I–II, 1881–1882
[38] Przypkowski Tadeusz: Jan Heweliusz 1611–1687. Wrocław 1987
[39] Rybka Przemysław: Instrumentarium astronomiczne Heweliusza. Wrocław 1987
[40] Schottmüller Kurt: Adam Wiebe ein Danziger Ingenieur im 17. Jahrhundert. [in:] Mitteilungen des Westpreußischen Geschichtsvereins. Jg. 10. 1911, pp. 76–88
[41] Schumann Eduard: Geschichte der Naturforschenden Gesellschaft in Danzig 1743– 1892. Danzig 1893
[42] Schwarz Friedrich: Danziger Ärzte im 16.–18. Jahrhundert. [in:] Danziger familiengeschichtliche Beiträge, H. 4. Danzig 1939, pp. 27–36
[43] Simson Paul: Aus der Geschichte des Danziger Schulwesens. [in:] Festschrift für die 17. Westpreußische Provinzial-Lehrerversammlung. Danzig 1903, pp. 58–80
[44] Simson Paul: Geschichte der Stadt Danzig, Bd. 1, 2, 4. Danzig 1913–1917
[45] Sokół Stanisław: Medycyna w Gdańsku w dobie Odrodzenia. Wrocław–Warszawa 1960
[46] Star Peter van der: Fahrenheit's Letters to Leibnitz and Boerhaave. Leiden 1983
[47] Śliwiński Błażej (sci. ed.): Encyklopedia Gdańska. (the Internet version: Gedanopedia – continuously actualized and suplemented) Gdańsk 2012
[48] Śliwiński Błażej: Początki Gdańska. Dzieje ziem nad zachodnim brzegiem Zatoki Gdańskiej w I połowie X w. Gdańsk 2009
[49] Trunz Hansheinrich: Apotheker und Apotheken in Ost- und Westpreußen 1397–1945. Hamburg 1992
[50] Turek Marian (ed.): Johannes Hevelius and his Gdańsk. Gdansk 2013
[51] Wangerin Albert: Beiträge und Dokumente zur Geschichte der Technischen Hochschule Danzig 1904–1945. Hannover 1979
[52] Weichbrodt geb. v. Tiedemann Dorothea: Patrizier, Bürger, Einwohner der Freien u. Hansestadt Danzig, Bd. 1–4. Klausdorf 1986 i 1991
[53] Wierzbicki Daniel: Żywot i działalność Jana Heweliusza, astronoma polskiego. [in:] Pamiętnik Akademii Umiejętności, Wydział Filologiczny i Historyczno-Filozoficzny, t. VII, pp. 22–78. Kraków 1889

Bibliography

[1] Abendroth Walter: Arthur Schopenhauer in Selbstzeugnissen und Bilddokumenten. Reinbek 1967

[2] Backe Hans: Rund um die Physik. Berlin, Bd. (1973)

[3] Brandstätter: Land und Leute des Landkreises Danzig. Danzig 1879

[4] Cieślak Edmund (ed.): Historia Gdańska, t. I–V. Gdańsk 1978–2000

[5] Curicke Reinhold: Der Stadt Danzig Historische Beschreibung. Amster- dam–Danzig 1687

[6] Danzig in naturwissenschaftlicher und medizinischer Beziehung. Danzig 1880

[7] Danzig und seine Bauten. Berlin 1908

[8] Danzig (Deutschlands Städtebau). Berlin–Halensee 1924

[9] Die Technische Hochschule Danzig. Berlin–Halensee 1930

[10] Drygas Aleksander: Aptekarstwo Gdańskie. Wrocław i in. 1983

[11] Faber von Bockelmann Elsa: Elisabeth Hevelius, geb. Coopmann. [in:] Weichselland 1940, 39, pp. 13–16

[12] Feldhaus Franz M.: Lexikon der Erfindungen und Entdeckungen auf den Gebieten der Naturwissenschaften und Technik. Heidelberg 1904

[13] Foltz Max: Geschichte des Danziger Stadthaushalts. Danzig 1912

[14] Januszajtis Andrzej: A Walk Around Gdansk for the Physicists. [in:] Physics in Perspective 2011, vol. 13, iss. 4, pp. 456–480

[15] Januszajtis Andrzej: Astronomy in Old Gdansk. [in:] AIP Conference Proce- edings, vol. 804: Planetary Nebulae as astronomical Tools, XV. New York 2005

[16] Januszajtis Andrzej: Daniel Gralath Starszy oraz Henryk Kühn. [in:] Wybitni Pomorzanie XVIII wieku. Wrocław 1983

[17] Januszajtis Andrzej: Gdańscy pionierzy fizyki. [in:] Studia i Materiały z Dziejów Nauki Polskiej, seria C, z. 20, 1975, pp. 13–26

[18] Januszajtis Andrzej: Gdańscy pionierzy metrologii. [in:] Krajowy Kongres Metrologii. Gdańsk 1998, pp. 66–79

[19] Januszajtis Andrzej: Gdańskie zegary, dzwony, karyliony. Pelplin 2003

[20] Januszajtis Andrzej: Georg Forster – ein kritisches Lebensbild. [in:] Deutsch- polnische Begegnung zu Wissenschaft und Kultur, Bd. 8, 2005, pp. 183–194

[21] Januszajtis Andrzej: Mr. Fahrenheit, dżentelmen z Gdańska, Gdańsk 2005

[22] Januszajtis Andrzej: Od Gyddanyzc do Wielkiego Gdańska. Gdańsk 2011

[23] Januszajtis Andrzej: Profesor Ignacy Adamczewski – gdański pionier fizyki. [in:] Pionierzy Politechniki Gdańskiej. Gdańsk 2005

[24] Januszajtis Andrzej: Societas Physicae Experimentalis – pierwsze w Polsce towarzystwo fizyczne. [in:] Studia i Materiały z Dziejów Nauki Polskiej, seria C, z. 23, 1979, pp. 35–42

[25] Januszajtis Andrzej: Suma przeszłości (zarys historii PG do 1945 r.) oraz Wydział Fizyki Technicznej i Matematyki Stosowanej. [in:] Politechnika Gdańska– 50 lat. Gdańsk 1995

[26] Januszajtis Andrzej: Uczeni dawnego Gdańska. [in:] Januszajtis Andrzej (ed.): Wielka Księga Miasta Gdańska. Gdańsk 1997

[27] Januszajtis Andrzej: Wissenschaftliche Traditionen Danzigs als Brücke in die Zukunft. [in:] Deutsch-polnische Begegnung zu Wissenschaft und Kultur, Bd. 1. 1997, pp. 37–44

[28] Januszajtis Andrzej: Piotr Krüger. [in:] Zasłużeni ludzie Pomorza Nadwiślańskiego XVII wieku. Wrocław 1982

[29] Januszajtis Andrzej: Zarys historii Politechniki Gdańskiej. [in:] Politechnika Gdańska – wczoraj, dziś, jutro. Gdańsk 1994

[30] Januszajtis Andrzej: Zegar astronomiczny w Kościele Mariackim w Gdańsku. Gdańsk 1998

[31] John Wilhelm: Allgemeiner Gewerbeverein zu Danzig. Festschrift zur Feier des fünfundsiebzigjährigen Bestehens. Danzig 1903

[32] Kotarski Edmund (ed.): Gdańskie Gimnazjum Akademickie, t. I. Szkice z dziejów. Gdańsk 2008

[33] Kubik Kazimierz: Profesor Paweł Pater, pionier kształcenia technicznego w Gdańsku. [in:] Gdańskie Gimnazjum Akademickie. Gdynia 1959, pp. 79–152

[34] Mamuszka Franciszek (ed.): Gdańsk, jego dzieje i kultura. Warszawa 1969

[35] Methner Arthur: Dr. med. Johann Gabriel Schmiedt. [in:] Mitteilungen des Westpreußischen Geschichtsvereins. 32. Jg., H. 1. 1933, pp. 12–14

[36] Nägelke Hans-Dieter: Hochschulbau im Kaiserreich: Historische Architektur im Prozeß bürgerlicher Konsensbildung. Kiel 2000

[37] Perlbach Max: Pommmerellisches Urkundenbuch. I–II, 1881–1882

[38] Przypkowski Tadeusz: Jan Heweliusz 1611–1687. Wrocław 1987

[39] Rybka Przemysław: Instrumentarium astronomiczne Heweliusza. Wrocław 1987

[40] Schottmüller Kurt: Adam Wiebe ein Danziger Ingenieur im 17. Jahrhundert. [in:] Mitteilungen des Westpreußischen Geschichtsvereins. Jg. 10. 1911, pp. 76–88

[41] Schumann Eduard: Geschichte der Naturforschenden Gesellschaft in Danzig 1743– 1892. Danzig 1893

[42] Schwarz Friedrich: Danziger Ärzte im 16.–18. Jahrhundert. [in:] Danziger familiengeschichtliche Beiträge, H. 4. Danzig 1939, pp. 27–36

[43] Simson Paul: Aus der Geschichte des Danziger Schulwesens. [in:] Festschrift für die 17.

Westpreußische Provinzial-Lehrerversammlung. Danzig 1903, pp. 58–80

[44] Simson Paul: Geschichte der Stadt Danzig, Bd. 1, 2, 4. Danzig 1913–1917

[45] Sokół Stanisław: Medycyna w Gdańsku w dobie Odrodzenia. Wrocław–Warszawa 1960

[46] Star Peter van der: Fahrenheit's Letters to Leibnitz and Boerhaave. Leiden 1983

[47] Śliwiński Błażej (sci. ed.): Encyklopedia Gdańska. (the Internet version: Gedanopedia – continuously actualized and suplemented) Gdańsk 2012

[48] Śliwiński Błażej: Początki Gdańska. Dzieje ziem nad zachodnim brzegiem Zatoki Gdańskiej w I połowie X w. Gdańsk 2009

[49] Trunz Hansheinrich: Apotheker und Apotheken in Ost- und Westpreußen 1397–1945. Hamburg 1992

[50] Turek Marian (ed.): Johannes Hevelius and his Gdańsk. Gdansk 2013

[51] Wangerin Albert: Beiträge und Dokumente zur Geschichte der Technischen Hochschule Danzig 1904–1945. Hannover 1979

[52] Weichbrodt geb. v. Tiedemann Dorothea: Patrizier, Bürger, Einwohner der Freien u. Hansestadt Danzig, Bd. 1–4. Klausdorf 1986 i 1991

[53] Wierzbicki Daniel: Żywot i działalność Jana Heweliusza, astronoma polskiego. [in:] Pamiętnik Akademii Umiejętności, Wydział Filologiczny i Historyczno-Filozoficzny, t. VII, pp. 22–78. Kraków 1889