

**SOCIETAS PHYSICAE EXPERIMENTALIS –  
THE FIRST PHYSICS SOCIETY IN POLAND.  
THE ORIGINS OF THE SOCIETY**

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The first attempt to organize in Gdansk a scientific society was made by Izrael Conrad (1634–1715) – a doctor, dealing also with physics. Responding to the call of the Royal Scientific Society from London he performed research on the influence of low temperature on the state of aggregation of substances, and on 3–5 February 1670 he gave a series of lectures *About the Nature and Functioning of Cold*, which were published in Oliwa 7 years later<sup>1</sup>. The text includes, among others, a description of the effect of over-cooling of liquids, discovered by Conrad. In another place we can read: “I often wonder how in the privacy of the house disappear uselessly all the gains that we bring, after many hardships and costs, from our foreign scientific travels. By hiding these achievements in the private houses and chests we delay the public profit coming from them and we hamper the development of science and of the inherent truth”. The scientist suggested creating a society similar to Italian academies, to which all the Gdansk science lovers would belong. The meetings would be spent on reporting the scientists’ own work and discoveries, as well as on discussing the most important foreign achievements. Conrad’s attempts, however, were not successful. The first in Gdansk (and in Poland) scientific society was the one created in 1720 upon the initiative of an outstanding historian Gotfryd Lengnich (1689–1774). Its name *Societas Litteraria* should properly be translated as the Learned Society<sup>2</sup>. It had a modern organizational structure, which could be seen from: the statute, protocols from sessions and fees. There were not more than a dozen or so members, including 9 regular ones. The aim of the Society was “not only to develop and satisfy brains by earnest and pleasant stimulation, but also to discuss one or more useful and interesting

1. J. Conrad, *Disseratio medico-phsica de frigoris natura et effectibus*, Oliwa 1677.

2. M. Pelczar, *Nauka i kultura w Gdańsku*, in: “Gdansk, its Origins and Culture”, Warsaw 1969.

matters from the fields of history, law, ethics, physics, mathematics, literature and other fields of science (yet, however, discussing any kind of theological questions was not considered proper)". As we can see, the statute included also the subject of physics.

There were two main trends in the work of the Society – the moral and natural ones. A lot of time during meetings was devoted to the questions of Polish political system. In 1727 the Learned Society stopped working because of some unknown reasons.

The need to have their own organization must have been strong among Gdansk scientific environment, because already 15 years later Daniel Gralath (1708–1767), a biologist and a later mayor<sup>3</sup> starts creating a new society, this time in the field of physics – *Societas Physicae Experimentalis*<sup>4</sup>.

We can consider the first meeting of the Society to be the private meeting on 7 November 1742, during which Gralath suggested organizing such society. At first there were 5 volunteers, and the assessor of the Right City – Adrian Söhner assigned a room for the meetings. On 22 November the first statute meeting took place, on 20 December the administration board was chosen. The first director was the previous member of the Learned Society – dr David Kade. After buying a vacuum pump on Wednesday, 2 January 1743, the first scientific meeting of 9 members was held at Söhner's place. In the first year of functioning the number of members went up to 14, and in 1793 – the year finishing the first stage of functioning of the Society (Gdansk was incorporated into Prussia) 91<sup>st</sup> ordinary member was registered, together with the 39<sup>th</sup> honorary one. They came mainly from among the learned members of the middle class – there were teachers, doctors, lawyers, priests and councilors. The founding members were: David Kade (1688–1763) doctor and physicist; Michal Hanow (1695–1773) a professor of the Academic Gymnasium, a versatile scientist, outstanding popularizer of science, in 1736 an editor of the first in Poland popularized scientific periodical *Explained Curiosities of Nature* (Erläuterte Merkwürdigkeiten der Natur); Henryk Kühn (1690–1769), a professor of the Gymnasium, an outstanding mathematician – creator of the geometrical interpretation of complex numbers, constructor of analytical balance, editor of calendars, a correspondent member of the Petersburg Academy of Science; Daniel Gralath, physicist<sup>5</sup>; Jacob Klein (1685–1759), Gralath's father in law, former member of Societatis Litterariae, botanist, famous for growing in Gdansk coffee trees that gave fruit, creator of an original zoological ordination; Adrian Söhner (1703–1761), assessor, a later long term director of the Society; Paweł Świetlicki (1699–1756), a priest, Polish language teacher at the Academic Gymnasium, vicar at St. John's church; Heinrich Rosenberg (1712–1794), lawyer, royal councilor, owner of the largest private library in the old Gdansk, of about 22 thousand volumes; Friedrich Zorn, baron von Plobsheim (1711–1789),

3. E. Schumann, *Der Bürgremeister Daniel Gralath, der Stifter der Naturforschenden Gesellschaft in Danzig*, "Schriften der Naturforschenden Gesellschaft zu Danzig", Neue Folge vol. 6, 4.

4. E. Schumann, *Geschichte der Naturforschenden Gesellschaft in Danzig 1743–1892*, Gdansk 1893.

5. A. Januszajtis, *Gdansk Pioneers of Physics*, "Studia i Materiały z Dziejów Nauki Polskiej", C series, vol. 20, 1975, pp. 13–26.

conchologist, he took care of the Society's collection. Among the honorary members were: a famous naturalist, participant of Cook's voyage, Johann Reinhold Forster from Tczew, and an outstanding Berlin astronomer Johan Bernoulli, together with three science protectors from Warsaw: Jean Dubois, chancellor Joachim Chreptowicz, and count August Moszyński.

An attempt to transform the Gdansk Society into a national royal scientific society in 1756 failed as a result of intrigues at the court of August III<sup>6</sup>. Since 1753 the Society also used the name: Naturalist Society (Naturforschende Gesellschaft) yet in Latin the name was always Societas Physicae Experimentalis. The end of the functioning of the Society is only marked by the last world war.

### Statute

The oldest statute of the Experimental Physics Society, resolved on 2 January 1743<sup>7</sup>, consisted of 26 paragraphs stating precisely the form and range of functioning. The Society was to be self-sufficient and autonomous. There were penalties decided for disturbing the statute. The members were divided into ordinary, honorary and free ones. The ordinary members' number was initially limited to 20, later it was unlimited. The honorary members could become those who "either *in statu politico* or *in republica litteraria* have special contributions ahead of others, and through their acknowledgement or outstanding knowledge could be helpful to the Society and increase its worth". The free members could take part in ordinary meetings, yet did not have to help in the experiments. They were divided into learned (*literati*) and not learned (*non literati*), the latter ones having to pay larger registration fees. The members were chosen by the simple majority of votes. From among the ordinary members a director, secretary and treasurer were chosen, who formed the administration board. The term of office was one year. It was, however, possible to prolong it.

The members of the Society were divided into classes, consisting of an operator and 2 co-operators. Each class had a task of performing experiments and observations for a month during ordinary sessions: "The operator leads the word, conducts the experiments and observes, and the co-operators help him in this and prepare what he tells them to". "During experiments and observations nobody is allowed to interrupt or disturb at work, they have to wait until the experiment is finished. Yet if someone noticed that the experimenters got lost in the lengthiness or in such a way that the experiment cannot be performed either at all or without unnecessary erring, then they can, after obtaining the director's permission, voice their doubts, and nobody should be surprised by that... as to any other member the truth is equally nice as it should be to themselves". In any other case all the remarks or suggestions for improvement should have been reported after the experiment was finished.

A separate paragraph, devoted to the art of discussion, warned the members to avoid contemptuous, bitter or indecent remarks. It was the director's duty to remind

6. W. Rolbiecki, *Science Society in Poland*, Warsaw 1972, cites the text of the project of royal privilege prepared by the Society, p. 83.

7. E. Schumann, *Geschichte...*, as above, p. 122 and following.

the participants of discussions “to use proper words or expressions fighting for truth or stating opinions, and after voicing their opinions concerning some questions, for the sake of truth quickly made up for any disagreement”. Whoever did not meet these requirements had to pay a fine to the treasurer!

To avoid unnecessary loss of time, the operators had to prepare the equipment for experiments in advance. Any member could participate in the preparations “according to their likes, to become more able for the sake of benefit and comfort, when their turn comes to do the same; yet nobody should disturb the operators in any way”.

It was suggested to perform systematically the experiments described in the three-volume handbook of physics by Chrystian Wolff<sup>8</sup> and in the Leipzig periodical *Acta Eruditorum*. The most interesting ones were to be repeated, and only after that could the new ones be prepared.

An important point in the statute was the decision about regular recording of the experiments and observations. When repeating someone else’s experiments it was necessary to present their author. If the results were different, they were to be reported especially carefully and then published. This was the duty of the secretary. “Yet to make it easier for the secretary, this will be the duty of the operators to make the co-operators duly describe whatever will appear strange or different in their experiments, and after careful checking, give it over to the secretary. The Secretarius, however, during the experiments will also write everything down, which will allow no place for mistakes”. The files of the Society were divided into *History* – including the history, resolutions and directives, *Ephemeras* – including the descriptions and register of the experiments, and *Commentaries* including scientific dissertations. “No member is allowed to change anything in the new discoveries described here, in order not to deprive the Society of the fame connected with the discovery”. Another duty of the secretary was to prepare and take care of the publishing of the dissertations approved by the Society.

The way of organizing the files (in German) was based on the reports (*Histoire et Memoires*) of the French Academy of Science.

Every member had the right to report on his work, having previously notified the director in writing. Also reports from outside were admitted – this could be a presentation of some equipment, drawing or an observed phenomenon. With the agreement of the board the outsiders could also take part in the sessions, in urgent cases it was enough to obtain the agreement of the secretary.

In the case of death of one of the members the secretary was to prepare and include in the files his short curriculum vitae and mention his contributions. Such files are today an inestimable source of information.

Usually the sessions were to take place every Wednesday “since St. Michael’s till Easter from 3 till 5, and since Easter till St. Michael’s from 4 till 6 in the afternoon”. The exceptions were the weeks: of Christmas, Holy Week, the week of Easter, Pentecost, and St. Dominic’s (the beginning of the famous fair, whose tradition dates back to 1260), and when the Wednesday was a holiday.

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8. Ch. Wolff, *Allerhand nützliche Versuche, dadurch der Weg zu genauer Erkänntnis der Natur gebahnet wird*, Halle 1721 and 1745.

In case an operator was unable to come to the meeting he should excuse himself to the director of the Society and name his substitute who was to perform the experiment, in case none of the co-operators wanted to do this.

A separate paragraph was devoted to the order of taking places and speaking. The priority was given to the director, after him came the operators in the order of class, then the secretary, treasurer and co-operators. Among the duties of the director was to assure that every member worked for common benefit, and to observe the statute during sessions. Apart from that he was responsible for all the matters connected with the Society. At the end of the year, basing on the lists prepared by the secretary and treasurer, he decided about crossing off the used goods and equipment and writing new ones. He had a vice-director to help him. The treasurer was responsible for the state and maintenance of the stock. “If, during ordinary work or a special experiment some piece of equipment gets broken, the operators will not be blamed for this, but the treasurer should take care of such equipment. If the operators need for their experiment some equipment that is not available, and it does not cost more than 8 florins, then the treasurer should provide such without additional questions, when they ask him to do so. At higher prices the first thing to do is to consult the finances of the Society.

At the end of the document the possibility of introducing changes in the Statute is mentioned. The whole is concluded with the signatures of all the members.

The first statute was in operation till 1786. It was later revised several times, yet the crucial points remained unchanged. Only in 1865 and 1875 were greater changes introduced. During all the years of the Society’s work Wednesdays were the days of ordinary sessions.

### Works in the field of physics

Societas Physicae Experimentalis was founded as a physics society. Since the first years the subjects were extended to the natural experiments. Much has been written about the work of the Society<sup>9</sup>. Here I will concentrate on the achievements in the field of physics – especially those of a pioneer character. The first place should be assigned to the works of Galath. The first three volumes of *Experiments and Dissertations* from the years 1747, 1754 and 1756<sup>10</sup> present his *History of Electricity* including a detailed analysis of everything that had been achieved in that field till those times. The author modestly cited the *Memoires* of Charles du Fay, yet his own work is so much more profound and wider that it can easily be recognized as the first in the world thorough description of the history of investigations in the field of electricity. Even greater achievement of Galath were his experiments. Due to Świetlicki’s mediation he got in touch with E. Kleist from Kamien Pomorski

9. K. Kubik, *Cooperation of the Academic Gymnasium with the Naturalist Society in Gdansk*, in “Gdańskie Gimnazjum Akademickie”, Gdynia 1959; K. Kubik and L. Mokrzecki, *Three Centuries of Gdansk Science*, Gdansk 1976; L. Jankowska, *Library of the Gdansk Natural Society and its development*, “Studia i Materiały z Dziejów Nauki Polskiej”, E series, vol. 6, 1977, pp. 165–214, and others.

10. *Versuche und Abhandlungen der Naturforschenden Gesellschaft in Danzig*, vol. 1, Gdansk 1747; vol. 2, Gdansk and Leipzig 1754; vol. 3, Gdansk and Leipzig 1756.

(Cammin), and already on 5 March 1746 he conducted in Gdansk a successful experiment with his bottle, later called the Leiden bottle. Galath's publications give a better explanation of the phenomena occurring in it than the superficial observations of Kleist and Muschenbroek. In April 1746 Galath put together the first in the world battery of the early condensers. In the same year he also conducted – again as the first one in the world! – measurements of electric attraction with the use of electrostatic balance, by doing which he became a predecessor of Cavendish and Coulomb.

Among the achievements of other members of the Society we should mention the constructed by H. Kühn interesting prototype of analytic scales with friction wheels. It was exactly this scales that Galath used in his experiments. In the first volume of dissertations Kühn also presented the theory of scales and weighing together with the design of an instrument using the connected vessels law to measure the drop of water in rivers. A pioneer character – at least in the country – had the experiments of Ch. Sendel with electromagnetism. The Gdansk scientist, still in the '50s of the 18<sup>th</sup> century – so before Franklin did that, managed to remagnetize the magnetic needle as a result of strong electric discharges. Among other points of interest there were also: the dependence between atmospheric pressure and altitude (M. Hanow), hydrostatic pressure (Galath repeated the experiment with Pascal's barrel), refraction and dispersion of light in the prism (J. De La Motte), capillary tubes (Schröder), cohesion and adhesion (Sendel), thermal expansion and changes of the state of aggregation (Lursenius), elastic and inelastic collisions with bifilar suspension of the colliding balls (Reinick), free fall of objects (Reyger), mechanics of materials (Schröder), cooling by vaporization (Hanow), and so on. In general, from 48 dissertations included in the first three volumes of *Experiments and Dissertations* 30 were devoted to physics, including meteorology, astronomy and popular texts (there were 17 clearly physical texts). Others dealt with botany and zoology.

In 1778 one more volume was published under the title *New Volume of Experiments and Dissertations*<sup>11</sup>, including 12 works, only two of which, however, in the field of physics. Only the dissertation by Efraim Krüger about free fall of objects in water and salt solution is worth mentioning.

In all, before the partitions, there were 60 works published, of which 32 in the field of physics. Among other achievements we should mention obtaining in 1746 the seat in the Green Gate. An important role in the Society played a doctor of Stanisław August – Nataniel Mateusz Wolf, residing in Gdansk since 1772. His work in the Society (since 1776) and his financial contribution led to opening an astronomical observatory – initially in the Coal Market, and since 1781 at Bishop's Hill. Unfortunately it was destroyed during the Napoleonic wars.

The process of departure from physics was noticeable during all the later work of the Society. In the 19<sup>th</sup> and 20<sup>th</sup> centuries, in spite of the growing number of members that was soon larger than 200, we can find only very few interesting dissertations in the field of physics. Among them are the works of F. Strehlke from the years 1827–1853, research and the theory of figures of Chladni, experiments in galvanoplasty, daguerreotypy and spectroscopy, performed and demonstrated in public as soon as the

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11. *Neue Sammlung von Versuchen und Abhandlungen*, vol. 1, Gdansk 1778.

news about their discovery reached Gdansk. Of some importance was also the research on the surface tension of saturated vapor (F. Kessler), measurement of pressure and velocity of water flow in pipes (H. Lampe), and the work in the history of physics (A. Momber, E. Schumann, L. Schnaase). In the period between the wars we can mention the lecture of F. Wolf from Oliwa *About the so-called Atom Fragmentation*. The last scientific meeting of the Society occurred in 1942.

In general, in the years 1815–1862 6 volumes of *The Newest Scripts of Naturalist Society*<sup>12</sup> were published in 24 scripts. They include 30 dissertations, including only 3 in the field of physics, 4 on meteorology, 4 on astronomy and navigation. It is worth mentioning that in 1852 the Society prepared a competition about compiling the theory of Foucault pendulum, demonstrated in Paris 2 years earlier. The prized work of P. Hansen from Gotha is still up to date. The members of the Society also published their works in the Poggendorff's Annals. At that time the honorary members of the Society were, among others: H. Ch. Ørsted, F. Bessel, J. Encke, F. Struve, F. Baily, D. Arago, A. von Humboldt, J. Berzelius, F. Pictet and P. Hansen.

Between 1864 and 1934 there were 20 volumes published of the *Scripts of the Naturalist Society* in the so-called New Series<sup>13</sup>. Every volume included 4 scripts. The topics of physics took less and less place in them.

Among the greatest achievements of the Society at that time is obtaining the seat at Mariacka 26 Street (in 1845), building the observatory there (1866), opening Nature Museum in the Green Gate (1880), and active participation in the efforts to found the Technical University of Gdansk (1904).

### The primacy problem

Basing on Rolbiecki's work<sup>14</sup> it is possible to compile a list of European Naturalist Societies according to their creation dates. Here it is:

- Accademia dei Lincei – Rome 1603 (existing till 1951)
- The Royal Society – London 1660 (still existing)
- Collegium Naturae Curiosorum – Schweinfurt 1652 (in 1670 transformed into Leopoldine-Caroline German Nature Academy with the seat in Halle – still existing)
- Accademia del Cimento – Florence 1657 (resolved in 1667)
- Science Society – Caen 1662
- Academie des Sciences – Paris 1666 (at present included in the Institute de France)
- Accademia Fisico-Matematica – Rome 1667
- Prussian Academy of Science (at present German Academy of Science) – Berlin 1700
- Societas Litteraria – Gdansk 1720 (existed till 1727)

12. *Neueste Schriften der Naturforschenden Gesellschaft*, vol. 1–6, Gdansk 1815–1862.

13. *Schriften der Naturforschenden Gesellschaft*, Neue Folge, vol. 1–20, Gdansk 1864–1934.

14. W. Rolbiecki, *Societies...*, as above.

- Petersburg Academy of Science – Petersburg 1724 (at present Russian Academy of Sciences)
- Societas Physicae Experimentalis – Gdansk 1743 (existed till 1945).

In the same year 1743 appeared the first American science societies in Boston and Philadelphia. All the societies mentioned also dealt with the subject of physics. As we can see, the Gdansk Society of Experimental Physics was the 11<sup>th</sup> one in the world and the second one in Poland (after the Learned Society) Naturalist Society, and the second one in the world and the first one in Poland society that described itself as the physics one. The next ones: Warsaw Physical-Chemical Society, and the Physical Sciences Society were created much later (in 1767 and 1777) and only worked for a short time (2 years each). The founder of the latter one – Jean Dubois – was a member of the Gdansk Society.

### Reminders

The Experimental Physics Society had an impressive scientific collection and a library of about 30 000 volumes. The naturalist part of the collection, with the second in the world amber collection, formed the main part of the collection of the Nature Museum in the Green Gate and was destroyed during the war. It would be worth checking if some of its parts are by any chance in some other museum in Poland, Germany or Russia. The collection of equipment (there were, among others, Hevelius' lenses and appliances) also got destroyed or lost. Only 138 books of the large library given over in 1923 to the Technical University of Gdansk survived the fire. The National Museum in Gdansk still has the bust of Hevelius – the gift of Stanisław August on the 100 anniversary of the astronomer's death. Another gift – the golden ring ornamented with diamonds and the king's image – that was worn by the directors of the Society still in the 19<sup>th</sup> century, got lost without trace. All the seats of the Society – the Green Gate (1746–1829), St. Jacob's Church in the Old City (1832–1845), and the tenement house in Mariacka Street (1846–1945) were rebuilt from the war destruction. The first one is today being renovated, the second one was given back to the sacral aims, and the beautiful House of the Naturalists is today the seat of the Archeological Museum. There is a stone at Bishop's Hill commemorating the place where Mateusz Wolf is buried, and a second one – in the Alley of Victory – that was put there on the 150<sup>th</sup> anniversary of creating the Society to commemorate Galath's achievements. And that is all that is remaining after the first in Poland physical society. . .

In 1978 the 853 volumes from the Society's library have been discovered in the University Library in Bremen – deposited there by a German professor who fled from Gdansk at the end of the last war. The further developments will be described in the next issue.

*Translation: Anna Kucharska-Raczunas*