Marián Kireš

Some Historical Points of View on Electricity in the Slovak Region

Abstract

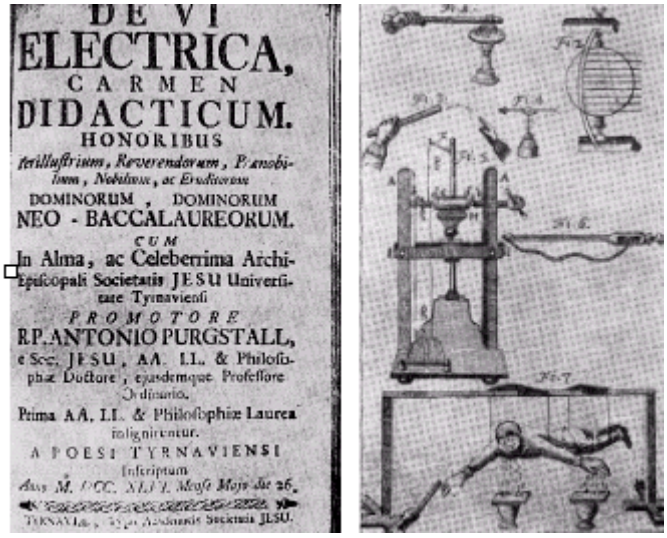
Interest in electricity was marked in Slovakia as well. First remarks dated back to the beginning of the 18th century but they did not have scientific nature. The sparks were connected with minerals and lightning with meteors. Remarkably, we can distinguish between antefranklin and postfranklin periods.

I have mentioned some very important persons for Slovakia in recalling the development of electricity in Slovakia in the first half of the 19th century.

In 18th century there was a big interest in electric phenomena in the whole world. Two circumstances changed the originally amusing nature of experiments in the field of electricity in the second half of the century: discovery of the so-called Leyden bottle and atmospheric electricity. It was possible to concentrate a bigger amount of charge in the Leyden bottle and so to raise big sparks. Then it was easier to find out affinity between an electric spark and lightning. Richman's tragic death in the year 1753 showed that a new strong weapon was invented. The invention of the lightning conductor made Franklin very popular and represented a fast spread of his inventions.

1. Antefranklin Period

This period is marked with the works of Daniel Fisher. He was born on 1695 in Kežmarok. He worked there as a general practitioner and as an active investigator/research-worker. In spite of the fact that most of his works are devoted to medicine, his works on physics are known as well: *Elementa physicae auctore D. Fisher, De calore atmospherice* from the 20's and his work *About lightning, thunder and bolts of lightning* published in Latin in the year 1717. His understanding of what can cause lightning was based on the affirmation that lightning could be caused by chemical reaction. Even if there is an indication of endeavour in scientific research, he saw prayer as the only possibility of protection against lightning. He belongs among the first scientists in Slovakia who tried to "give" the collective nature and planning in the field of nature science. He died in 1746.



DE VI
ELECTRICA,
CARMEN
DIDACTICUM.
HONORIBUS
Illustrium, Reverendorum, Praenobilium, Nobilium, ac Eruditorum
DOMINORUM, DOMINORUM
NEO - BACCALAUREORUM.
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In Alma, ac Celeberrima Archi-Episcopali Societatis JESU Universitate Tyrnaviensi
PROMOTORE
RP. ANTONIO PURGSTALL,
e Soc. JESU, AA. LL. & Philosophiæ Doctore, ejusdemque Professore Ordinario.
Prima AA. LL. & Philosophiæ Laurea insignirentur.
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Inscriptum
Anno M. DCC. XLVI. Mensi Maio die 26.
TYRNAVIæ, Typis Academicis Societatis JESU.

Figure 1a, b

Before the year 1751 the question on electricity appears only sporadically. Only one important work from this period is a rhymed composition by J. Purginu (1719-1748) (Figure 1a,b) from the year 1746 with the title *De vi electrica carmen didacticum* (instructive poem on electric power). The author came from Trnava and he studied theology. The work consists of three parts: in the first one he studied the electricity originating from friction, in the second part he spoke about "delivered" electricity – about conductors and the last one is about light and fire from electric elements. This discourse is considered to be the first about electricity in Slovakia.

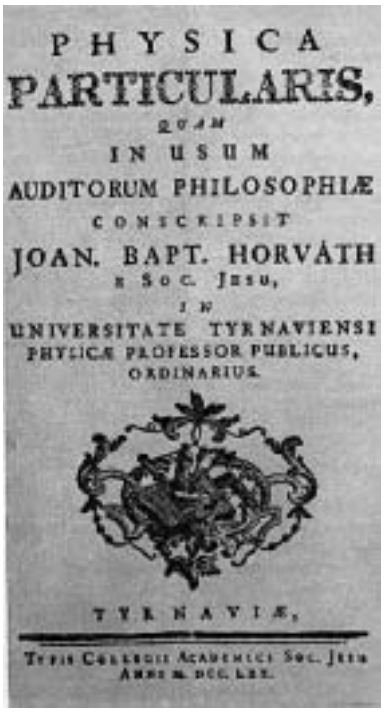
2. Postfranklin Period

The Leyden bottle and Franklin's experiments with atmospheric electricity speeded up experimental activity in the field of physics in Slovakia. But there was no interest on the part of the government which had an unfavourable effect on this fact.

One of the first authors, influenced by the Italian scholar G.B. Beccaria, was A. Horányi. He published his work *De artificiali electricismo ex Beniamini Franklini theoria* in Rome in 1756. In his work Horányi explains basic electric phenomena. He did not deal with atmospheric electricity but it is dedicated to electric steam and the existence of electric atmosphere. He distinguished between two kinds of electricity: positive and negative which is founded on theoretical explanation. He made an analysis of the Leyden bottle and he "defended" Franklin's experiments. He submitted an analysis of the four elements from the point of view of electricity.

Air is an insulator, water is a conductor, fire supports spreading of electricity and earth is a conductor.

The Slovak B. Bucsányi (1793-1796) was very deeply devoted to this question, he provided wider experiences in the field of physics and evidence about the original interesting opinions in his work. About lightning and thunder as phenomena of electricity published in 1757. He was born in Zvolen, studied in Göttingen and lived in Hamburg. He wrote some works on algebra andabout atmospheric electricity. M. Bucsányi spoke about an electric liquid, analysed characteristic features of an electric spark in order to be able to be compared it with a lightning. In his work he argued against various superstitions and popular idle talk connected with lightning and thunder, he explained and launched a new notion, *radius electricus,* and described what a good lightning conductor should look like.


PHYSICA
PARTICULARIS,
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AUDITORUM PHILOSOPHIÆ
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JOAN. BAPT. HORVÁTH
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PHYSICÆ PROFESSOR PUBLICUS,
ORDINARIUS.
TYRNAVIÆ,

Figure 2

Makó and Radics contributed most importantly by their works to the "promotion" (build-up) of electricity in Slovakia. In their similar works, as far as content is concerned, *Set of Physical Science Written for the Needs of Students* and *Physics for the Needs of Students* from the year 1766 are dedicated, inter alia, to the problem of connection.

J. Horváth (1732-1799) belonged to the most important authors of the physics textbooks in contemporary Slovakia in 18th century. He worked at Trnava University as a professor. His two textbooks *Physica generalis* and *Physica particularis* (Figure 2) were published in the years 1767 and 1770. The sixth chapter deals with electricity, which is connected with Makó's work as far as opinions is concerned but however it dealt with "favourite" medical electricity: he described Volt's electrophorus and condenser (condensator).

Another author dealing with electricity was Leopold Scaffrath (1734-1808). In his dissertation work *About Atmospheric Electricity and Protection of Buildings before the Stroke of Lightning* published in 1778 he described a real stroke of lightning and he recommended specific protection before a lightning storm. He was one of the few researchers who were able to apply theoretical knowledge to specific

practical problems. L. Schaffarath was born in Bratislava, belonged to piarists, studied in Pisa, worked in Budapest.

At the end of the list of the works from the field of electrostatics is the work of an amateur J. Valentini, a priest from Kláštor pod Znievom. In his work *Exercitatio electrica* published in 1810 he described 31 experiments. Most of them were simple and one part out of them was dedicated to electricity experiments which he carried out himself.

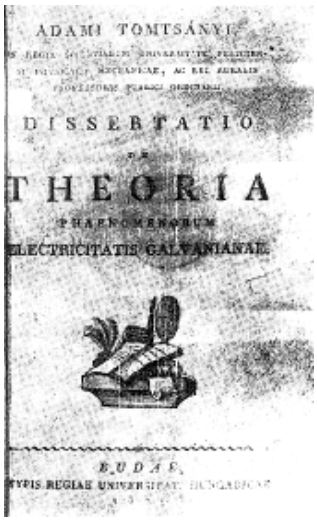

Figure 3

3. Period of Galvanism

In 19th century great attention was paid to Galvanism, which became more interesting than for example Franklin's experiments. A. Tomcsányi (1755-1831) was the first person to react to this problem in his monograph *Dissertatio de theoria phaenomenorum electricitatis galvanianae* (Figure 3) containing 355 pages and published in 1809. In his work he studied, inter alia, animal electricity and noteworthy is the fact, that he mentioned the chemical effect of the current.

Extremely modest but very interesting is the work by A. Fuchs published in 1856 about the behaviour of the (water) jet in the electric field.

The most important person in the Slovak history of physics, even though not so known in the world, is Š.A. Jedlík (1800-1895). He was a lecturer in physics and agriculture at Bratislava Academy. It is known about him that he invented the so-called dynamo principle (Figure 4) six years earlier than Siemens, or perhaps 20 years earlier. In the year 1828 he constructed a small movable magnet for electric experiments, which in an essence was an electromotor.

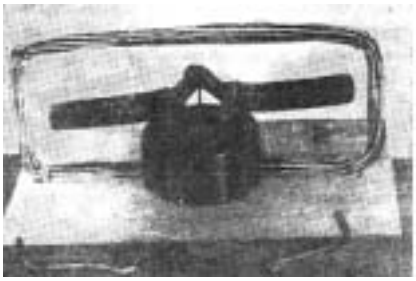

Figure 4

Social conditions under the Habsburgs monarchy did not create for him conditions for his professional development, publishing and promoting scientific knowledge, which he gained through his own experimental activity. The equipment for cutting very fine optical grids belonged to the most important inventions of the years 1840-1850. After 1850 he intensively dealt with finding ideal current resource voltage. He dealt with improving of galvanic cells. Very special is Jedlík's unipolar dynamo, in which the polarity of the magnetic field had been changing at every turn/speed and so the one-stream current was generated.

I have mentioned some very important persons for Slovakia in recalling the development of electricity in Slovakia in the first half of the 19th century. I have not mentioned some others like e.g. Hell, Fröhlich, Jaslinský, Kemplen, Pankl, because their important works in the field of physics did not concern electricity.

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