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**UNCOVERING SOME HIDDEN PAGES IN
THE LIFE OF THOMAS JOHANN SEEBECK**

Why the long-lasting friendship between Seebeck and Hegel was suddenly interrupted? In what way Goethe was involved in this quarrel? How this conflict influenced Seebeck's further career? Answers to these questions have been found mostly from correspondence of Hegel, Seebeck, Goethe, and their contemporaries.

Key words: Seebeck, Hegel, Goethe.

Introduction

Thomas Johann Seebeck [1, 2], a german-estonian physicist, chemist and physician was born on April 9, 1770 in the Hanseatic town of Reval (now Tallinn). His father Johann Christoph Seebeck, a wealthy merchant, was descending from an old Livonian family with Scandinavian roots. He became a citizen of Tallinn in January 1769, married merchant's daughter Gerdrutha Lohmann and purchased a real estate at the Great Market, today Raekoja plats 4/Dunkri 2. In this house the future scientist was born in 1770. Shortly after graduating from Town Imperial Grammar School (now Tallinn Gustav Adolf Grammar School) at the age of 17, Thomas Johann moved to Germany to study medicine. In 1792, Seebeck passed at Göttingen the final exams in medicine and practical surgery with excellent marks. However, deeply influenced by charismatic professor of physics Georg Christoph Lichtenberg Seebeck decided to devote himself to physics.

In 1795 Seebeck married Juliane Boye and they settled in Bayreuth. Seebeck father's inheritance allowed him to live as an independent private scholar and he did not need to practice as a medical doctor.

Nevertheless, in March 1802, Seebeck received his Dr. Med. degree from the University of Göttingen and in summer Thomas Johann with his wife and six daughters moved to Jena. Later Seebeck lived and worked in Bayreuth, Nuremberg, and Berlin. Thomas Johann Seebeck died in Berlin on December 10, 1831. Only a month earlier, on November 14, 1831, his friend Georg Wilhelm Friedrich Hegel died in Berlin as a victim of a cholera epidemy. Very soon, Johann Wolfgang Goethe, who was a friend both of them died on March 22, 1832 in Weimar.

Seebeck in Jena 1802-1810

In 1802, Seebeck arrived in Jena. His motive was to get acquainted with Schelling and attend his lectures on *Naturphilosophie*. In Jena Seebeck found himself in a very busy intellectual environment. This was a period of transition from the Weimar Classicism to the Preromanticism of Jena. Of course, a central figure of the cultural and social life was Johann Wolfgang Goethe, a great poet and passionate naturalist and researcher. As an influential administrator at the Court of Weimar

and a personal friend of the Duke of Saxe-Weimar-Eisenach he kindly helped young talents to start their academic career.

At the turn of the 18/19th centuries Goethe's most famous protégés in Jena were:

1789 – F. Schiller (30 years of age), an appointed professor of History and Philosophy;

1798 – F. W. J. Schelling (23), an extraordinary professor of Philosophy of nature;

1801 – G. W. F. Hegel (31), a private docent of German Philosophy and. His inaugural dissertation was „De Orbitis Planetarum“ (Jena, 1801); in 1805/06 – an extraordinary professor of Philosophy without remuneration.

1803 – J. W. Ritter (20) arrived in Jena to study medicine. For a shorter period he, a practically self-taught scholar, collaborated with Goethe and Alexander von Humboldt and in 1803/04 he lectured at the University of Jena. In 1801 Ritter discovered „chemical light“, i.e. the ultraviolet radiation. This discovery was made following the principle of polarity, one of the basic ideas of the Naturphilosophy. Ritter knew that Herschel had recently discovered so-called „thermal light“ beyond the red end of prismatic light and so Ritter expected to find something interesting beyond the violet end of the sunlight spectrum, as well.

Seebeck met Goethe for the first time at a dinner on December 3, 1803. Hegel, at that time a very sociable young man who loved to play cards and drink expensive wines, was also invited. Soon Seebeck's seventh child was born and Hegel and Ritter were among invited godparents. Unfortunately, Seebeck's little son died shortly.

Schelling, entangled in a love affair was forced to leave Jena in 1803. Next year Ritter was elected to the Bavarian Academy of Sciences and he left for Munich. Goethe was seeking a new companion to assist him in his optical studies. Seebeck as a well-educated and experienced researcher was certainly the best choice for Goethe. Their frequent and long-lasting cooperation resulted in many Seebeck's contributions printed in „*Zur Farbenlehre*“ (Theory of colors), the most important scholarly work of Goethe.

The battle of Jena/Auerstedt on October 14, 1806 between Napoleonic and Prussian armies ended an idyllic life in the small university town. French canon fire destroyed Hegel's and Seebeck's houses and their common friend bookseller Frommann offered shelter. Under French occupation the university in Jena was temporarily closed and many professors were ejected. Hegel also lost the job. His father's inheritance was spent, and, last but not least, his illegitimate son was born in February. Hegel rushed away to Bamberg. His friend Immanuel Niethammer helped Hegel to find a job as an editor of a local catholic newspaper. However, Seebeck stayed on in Jena to assist Goethe in editing of his book „*Zur Farbenlehre*“.

In 1809, Goethe and Hegel urged Seebeck to apply for a vacant professorship of chemistry and technology at the University of Jena. However, Seebeck's refusal was a great disappointment to his friends. Moreover, it came out that Seebeck was not at all seriously interested in teaching, he was expecting to get a position in an Academy. In May 1810 printing of Goethe's „*Zur Farbenlehre*“ in 2 volumes [3] was completed successfully, and Seebeck began preparations for leaving. In his letter to Karl Ludwig von Knebel Seebeck wrote that the cost of living has risen so high that it is absolutely necessary to find a cheaper residence. He had soon eight children to maintain – six daughters and two sons. Later on, his sons August and Moritz played a prominent role in German science and education.

Seebeck in Bayreuth 1810 – 1812

Of course, behind of Seebeck's decision to leave Jena was a practical reasoning.

First of all, Seebeck met increasing financial difficulties. Living in Germany Seebeck carried on his father's business through lessees in Estland and Switzerland. However, Napoleonic wars and the Continental Blockade were hindering transit trade to Russia. In May 1811, his tenant in Reval died and Seebeck had to travel to Estland. He spent the whole summer in Reval and Berlin and returned to Bayreuth in November. Very soon, he had to travel to St. Gallen where his lessee of a textile factory was fighting with bad financial difficulties.

Second, Seebeck just needed a rest from Goethe's dominance in order to obtain more freedom and space for his own interests and ideas.

Printing of Goethe's *Zur Farbenlehre* was completed. Seebeck knew that his scientific contribution and practical assistance helped Goethe a lot. But he felt that sometimes Goethe dominated too much and forced upon his speculative theories contradicting to the mainstream physics, i.e. the Newton's optics. Seebeck as an excellent experimental physicist was well informed about the latest achievements of mainstream science and tried to get rid of Goethe's „natural“ science.

Seebeck in Nuremberg 1812 – 1819

In July 1812 Seebeck took up residence in Nuremberg, again driven by essential practical considerations.

First of all, Seebeck's sons Moritz and August, both of age 7, were ready to enter to Nuremberg Gymnasium where Hegel was the Rector and Professor of philosophy since 1808.

Second, Nuremberg, in comparison to Bayreuth, was a larger and more secure city and closer to Munich and St. Gallen. It should be noticed that Seebeck was still waiting for an invitation to the Bavarian Academy in Munich. Unfortunately, his dream never came true.

Third, in Nuremberg Seebeck got again a chance to set up a laboratory. In the middle of August 1812 he started experiments which led to discovery of birefringence in annealed and tempered glass [4].

In his letter to Seebeck of 15 January 1813 Goethe proposed to repeat Morichini's experiments in order to verify author's conclusion that violet light can magnetize a steel needle. Seebeck politely rejected Goethe's proposal. He wrote that he is very busy studying light polarization by reflection from a glass plate, an effect discovered a few years ago by French physicist Malus. On the 21th of February 1813, using a polariscope of original construction Seebeck obtained „full entoptic figures“, i.e. inference fringes in annealed and tempered glass samples. The term „entoptic“ was proposed by Hegel in accordance to the color theory of Goethe which is defining di-, ep-, and paroptic colors depending on conditions of their appearance.

A year later, David Brewster rediscovered the photoelasticity in glass. In 1815, on 26th of December, Seebeck and Brewster shared the French Academy prize (6000 francs) for the best experimental work published between Oct 1, 1813 and Oct 1, 1815. Two Seebeck papers printed in the Schweigger's *Journal für Chemie, Physik und Mineralogie* were submitted to the Academy by François Arago.

In his letter to Goethe of 30 December 1815 Seebeck writes that Vasily Vladimirovich Petrov was elected to the St. Petersburg Academy. Another hope was lost.

On July 30, 1816, Hegel was appointed to the chair of Philosophy at Heidelberg, again by help of Immanuel Niethammer, who at this time was Central Commissioner of Education of Bavaria. Hegel and Niethammer were old friends. For the first time they met in 1784 as schoolmates at the Tübingen Stift. Later on, Niethammer studied and lectured Philosophy in Jena up to 1804.

In the letter to Goethe of 9 September 1816 Seebeck writes that he submitted an application to

Heidelberg university for the professorship of physics. At the same time, his friend physicist Johann Schweigger applied for the membership of Bavarian Academy of Sciences in Munich. Schweigger was elected, but Seebeck – not! Why?

Heinrich Paulus, professor of philosophy and church history at Heidelberg asked Hegel for an opinion of Dr. Seebeck in regard to coming elections at the University. Paulus was interested in what Hegel thinks of Seebeck's character and intellectual abilities considering his possible appointment to the post of professor of physics. At that time Hegel was still living in Nuremberg. Paulus was aware that Hegel and Seebeck have had close and friendly relations for many years. For instance, Seebeck was among godfathers of Hegel's newborn child, whose christen name Thomas Immanuel Christian was combined from the given names of Seebeck, Niethammer, and Hegel's sister Christiane [5].

In a letter of 13 September 1816 Hegel wrote to Paulus that Seebeck "was indeed a fine fellow but not a first-rate thinker"[6]. As a result, Seebeck was not elected. A little-known physicist G. W. Muncke was elected instead of Seebeck.

Later on, Paulus unintentionally revealed Hegel's confidential evaluation of Seebeck's intellectual abilities (Hegel used here the word *die Genialität*) and this unpleasant incident broke forever all ties between two friends.

Goethe tried to reconcile the parties. In a letter of 8 July 1817 Goethe wrote to Seebeck and repeated his proposal to start a new research on color theory. However, he added accidentally that "smart and capable" Hegel will also take part. This was too much for Seebeck! He was offended and in his letter of 29 July 1817 Seebeck politely rejected Goethe's proposal. He advised Goethe to arrange his own experiments and publish obtained results independently.

Seebeck in Berlin 1819 – 1831

At long last, on Juni 25, 1818 Seebeck was elected corresponding member of the Berlin Academy for his works on optics. From the 1th of January, 1819 Seebeck was a full member of the Academy and on March 13 1819 Seebeck delivered his first report at a session of the Berlin Academy. His speech, entitled *Ueber die ungleiche Erregung der Wärme im prismatischen Sonnenbilde* covered so far unpublished experimental results from years 1806, 1807, and 1809.

Hegel, succeeding J. G. Fichte as a professor of philosophy moved to Berlin, and on October 22, 1818 he delivered his inaugural lecture at the University of Berlin.

In July 1819 Seebeck's wife and children also moved to Berlin. While traveling through Jena they met Goethe. On December 11, 1819 Seebeck wrote his last letter to Goethe. Now, at last, he was free and open for new challenges.

On July 21, 1820 Oersted published his famous essay *Experiments about the Effects of an Electrical Current on the Magnetic Needle* [7]. He sent the booklet to many leading scientists and societies in Europe and America. Oersted's discovery opened the door to a new field of science – the electromagnetism.

Seebeck immediately put aside his experiments on optics and began to examine Oersted's findings. And very soon, within a few months Seebeck achieved his most important result – he discovered the "thermomagnetism". On December 14 1820 Seebeck reported for the first time on his discovery to the Berlin Academy. However, his first comprehensive publication on this issue appeared only in 1822 [8]. In November Oersted arrived in Berlin and on December 2, 1822 he writes to his wife that recently he visited Seebeck's laboratory to see his new experiments. In January Oersted was soon in Paris and on March 23, 1823 he reported to the French Academy about Seebeck's discovery

giving physically correct interpretation of the new phenomenon and coining the term “thermoelectricity”.

In his letter of 4 April 1823 Oersted writes from Paris to his wife in Copenhagen that Seebeck’s discovery is «the most beautiful of the discoveries which have so far grown out of mine» [9].

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References

1. Velmre, E. Thomas Johann Seebeck (1770 – 1831). Proc. of the Estonian Academy of Sciences, vol. 13, 2007, № 4, p. 276 – 282.
2. Velmre, E. Thomas Johann Seebeck and his contribution to the modern science and Technology. Proc. of the 12th Biennial Baltic Electronics Conference. Tallinn University of Technology, 2010, p. 17 – 24.
3. Goethe, J. W. Zur Farbenlehre. Cotta, Tübingen, 1810.
4. Aben, H. On the role of T. J. Seebeck in the discovery of the photoelastic effect in glass. Proc. of the Estonian Academy of Sciences, vol. 13, 2007, № 4, p. 283 – 294.
5. Pinkard, T. Hegel: A Biography. Cambridge University Press, 2001. p. 314.
6. Briefe von und an Hegel: 1813 bis 1822, Eds. J. Hoffmeister and F. Nicolin. Meiner Verlag, 1969, p. 132.
7. Oersted, H. C. Experimenta circa effectum conflictus electrici in acum magneticam. Hafniae, 1820, 4 pages.
8. Seebeck, T. J. Magnetische Polarisation der Metalle und Erze durch Temperatur-Differenz. Abhandlungen der Königlichen Akademie der Wissenschaften in Berlin, Abhandlungen von 1820-21, 1822, p. 289 – 346.
9. Breve fra og til Hans Christian Ørsted. Ed. Mathilde Ørsted. 2 vols. Copenhagen:Th. Linds Forlag, 1870.

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