Gauss-Weber Monument

W. Voigt

Editor's Note: An English translation of W. Voigt's 1899 speech on the unveiling of the monument to Gauss and Weber in Göttingen.[1]

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[1] [Voi99].

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Chapter 1

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On June 17 of this year [1899] the monument for

Carl Friedrich Gauss and Wilhelm Weber

was unveiled in Göttingen, whose construction was supported by the Association of German Engineers. We publish the speech, which was kindly provided to us by Professor W. Voigt, dean of the Faculty of Philosophy of Göttingen University. The celebration came along with an exhibition on Gauss and Weber, which showed a wealth of keepsakes, instruments and documents from the busy life of the two researchers, but as well amazing treasures of their previously unknown handwritings. The speech was as follows.

Dear festive gathering,

it is a great pleasure to welcome you at the feet of the monument. Seven years we struggled to achieve it. This festive hour symbolizes the goal of our wishes. The University and the town of Göttingen join the festivity and many of their representatives gather here. Honored guests from various places came to Göttingen to celebrate the monument and the memory of the men, whose names are well-known and highly esteemed, wherever the sciences find love and care.

It was in the winter of 1891 to 1892, a few months after Wilhelm Weber passed away, when the representatives of the topics taught by Gauss and Weber gathered wishing to build a joint monument for the two eminent researchers at the place of their major achievements. This idea existed secretely already before, since the time when Gauss passed away. It was the reason that our Association accepted it that Braunschweig, the native city of Gauss,

[2] [Voi99].

[3] Translated by U. Frauenfelder, urs.frauenfelder@math.uni-augsburg.de. Edited by A. K. T. Assis, www.ifi.unicamp.br/~assis. We thank Karin Reich for bringing this text to our attention and for the following information: The keynote speech was given by Woldemar Voigt (1850-1919), the successor to Johann Benedikt Listing (1808-1882). Listing had completed his doctorate under Carl Friedrich Gauss (1777-1855) in 1834 with a mathematical thesis and became the successor of Wilhelm Eduard Weber (1804-1891) in Göttingen in 1838. When Weber was called back to Göttingen in 1849, a new chair was created for Weber. From then on, Weber represented experimental physics and Listing, like his successor W. Voigt, held the chair of theoretical physics.

[4] The Notes by A. K. T. Assis are represented by [Note by AKTA:].

before us honoured him. Then it was clear to everybody that in the history of the University and city of Göttingen the name of Gauss for all times is intimately connected with the name of Weber.

Now after the work of Weber found an end, the idea of a joint monument naturally manifested itself. At the place of their work we are connected to one of them by a living tradition to the other by a personal relationship.

What signify Gauss and Weber to us?

Already after his first successes a century before, the scientific world felt clearly that with Gauss a first grade discoverer entered the scene. When he passed away 45 years ago one mourned that a king left who mastered the broadest areas of science.

Even more fantastic things than the published works teach in their ice-cold, crystal-clear beauty, his inconspicuous diaries reveal us. Just recently the grandson of the great master gave us to our use a little diary covering for many years the records of his discoveries.

Restless like led and ruled by a demon he is digging tunnels into unexplored areas. A demon shows him the way to countless veins of gold. But only little of it he brings to light elaborated for the use of others. Most of it he hides from the world happy to possess it secretly.

Only decades later, when other people unlock these veins from different sides, the traces of his powerful hand are revealed.

Still almost a boy he successfully attacks problems on which the brightest minds of previous times failed. 16 years old he devotes himself to the most difficult questions on the foundations of geometry. 17 years old he finds that invaluable method to exploit measurements rationally and unbiased. 19 years old he constructs the 17-gon by ruler and compass one of the first great leaps forward since the time of Euclid. 22 years old he is anticipating the basic ideas of the theory of quaternions developed much later by Hamilton. With 23 years he discovers many results on elliptic functions rediscovered later. In his 25th year he devotes himself suddenly to astronomy and achieves a major breakthrough by determining the orbit of Ceres. In the following he caused so much sensation by further theoretical and observational results obtained with limited resources that he gets with 30 years an offer for the professorship of astronomy at Göttingen. With 32 years he publishes *Theoria motus corporum coelestium* which puts him on equal footing with the first theoretical astronomers of all times.[5]

After getting the offer from Göttingen Gauss gains on the one hand an honorable, secure position but he looses the precious freedom to choose his ways as he likes. He needs to deal with a lot of time-consuming work of little scientific significance.

Despite of that he devotes himself energetically two further scientific topics, namely geodesics and mathematical physics, where he attains many outstanding achievements. To it belong as well two major scientific endeavours, which occupy Gauss until his death. These are the arc measurements in Hanover and the organization of the geomagnetic observations. Not only directly thanks to the results obtained, but as well indirectly by opening up new research directions these were of great importance and benefit for science. To help him with his geomagnetic plans Gauss brings W. Weber to Göttingen.

The first scientific stimuli which Weber got in his hometown Wittenberg from the well-known musician Chladni as well as from his older brother Ernst Heinrich led him to the topic of acoustics.[6] After obtaining important results in this field he got quite young an associate

[5] [Note by AKTA:] [Gau09] with English translation in [Gau57].

[6] [Note by AKTA:] Ernst Chladni (1756-1827) was a German physicist and musician. Ernst Heinrich

professorship in Halle and he gained the interest and confidence of Gauss.

To appreciate the relationship between the two men one should as well take into account their age difference. Gauss was 53 years old, when the 26 year old Weber moved to Göttingen. That the 27 years younger Weber first was led and stimulated by Gauss does not belittle him. Heinrich Hertz as well was first influenced heavily by the much older Helmholtz and nevertheless achieved outstanding results.[7]

Gauss devised the general theory of terrestrial magnetism.[8] The task was to make systematic measurements in order to apply the theory. The organization of the newly founded Magnetic Association, the planning of the observations as well as the exploitation of the results is mainly Weber's enormous, unforgettable merit.

An outcome of this magnetic collaboration was the invention which mainly popularized the names of Gauss and Weber, namely the installation of the first electromagnetic telegraph in the year 1833. By the practical realization of an idea with a great impact on communication, they became the pioneers of the flourishing field of Electrical Engineering.

The collaboration between Gauss and Weber was disrupted in the year 1837 when Weber lost his position due to his dauntless advocacy of his conviction. We do not blame that the 60 year old Gauss stayed neutral in the dispute. That the 33 year old Weber sacrificed his position to his conviction, we will never forget. In particular, by taking into account how important this position was for Weber because of its connection to Gauss.

It might be that the temporary separation from Gauss actually was an advantage for the scientific performance of Weber. Anyway in Leipzig his work found strong support from the Royal Scientific Society there and Weber's research took a quite independent, significant turn.

In Leipzig Weber began to write his "Elektrodynamischen Massbestimmungen — Electrodynamic Measurements" on which he was working until shortly before his death.[9] Of course one can find inspirations from Gauss in them as in every successor the achievements of his predecessor live on. But Weber there pursued quite new directions. He discovered his fundamental law of electricity and determined in an ingenious way his curious constant which turned out to have the same value as the speed of light. This inspired Maxwell to put the theoretical electrodynamics on a new foundation.[10] We further mention the fruitful keynote on the movement of ions in electrolytes, the amazing realization of the system of absolute measure as well as the brilliant construction of measuring devices for science and technology. These are all undisputed and everlasting achievements of Weber.

This was our vivid image of the men when we gathered seven years ago with the aim of building a monument for them.

Our first task was to find the rather large necessary sum of money for which a wide network seemed essential. For this reason we asked in the spring 1892 many scientists,

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Weber (1795-1878) was a German physician, one of the founders of experimental psychology.

[7] [Note by AKTA:] Heinrich Hertz (1857-1894) was a German physicist who was the first to produce electromagnetic waves. Hermann von Helmholtz (1821-1894) was a German physicist and physician.

[8] [Note by AKTA:] [Gau39] with English translations in [Gau41] and [GT14].

[9] [Note by AKTA:] Weber wrote eight major Memoirs between 1846 and 1878 under the general title *Electrodynamic Measurements* (*Elektrodynamische Maassbestimmungen*), [Web46], [Web52b], [Web52a], [KW57], [Web64], [Web71], [Web78] and [Web94]. The Eighth Memoir was published only posthumously in his collected works. All of these Memoirs have already been translated into English, [Ass21a], [Ass21b], [Ass21c] and [Ass21d].

[10] [Note by AKTA:] James Clerk Maxwell (1831-1879) was a Scottish physicist who developed an electromagnetic theory of light.

technicians, and civil servants in several countries to join and support a further committee in Göttingen for the construction of the monument for Gauss and Weber. Almost everybody we asked was supportive and excited which increased our hope to bring the project to a good end.

With this confidence we dared to ask the illustrious president of our University, his Royal Highness Prince Albrecht of Prussia, prince regent of the Duchy of Braunschweig, to take over the projection of our organization.[11] That his Royal Highness accepted our request greatly boosted our project, not just directly by providing a large sum of money from the budget of the Duchy of Braunschweig but as well indirectly by the force of his princely name which often was more effective than our modest request.

Unfortunately, our hope that his Royal Highness could join today's event did not materialize. By the advise of his doctors his Royal Highness cannot attend. Therefore we express remotely our sincere gratitude to our illustrious protector.

The collection for the monument of Gauss and Weber in Göttingen was very successful. We did not just receive many large and small contributions, but our supporters build as well collecting points in various towns from the near Braunschweig to the remote Tiflis and sent us the collected money.

However, two years ago this golden stream dried out before the basin was filled. At least we had collected enough money that success was guaranteed and we could dare to make bolder steps to bring our project to an end.

By a request which gained the approval of prominent supporters of our project we managed to get His Majesty the Emperor and King interested in the monument for Gauss and Weber. His most gracious donation not only increased our assets but as well inspired others to donate as well.

We are extremely grateful to His Majesty for this favor.

After this great help similar ones soon followed from the administration of Hanover and the town of Göttingen, to whom we would like to express as well our gratitude. To overcome the last remaining difficulty we got help thanks to the intervention of two splendid friends from Berlin, secretary of state Sydow and president Boedicker. They managed to get the big electrotechnical companies in Germany interested in the monument for Gauss and Weber. This blew new wind in our sails and our little ship finally reached its destiny a few weeks ago.

We would like to thank sincerely all our supporters.

Simultaneously with the financial aspects the artistic aspects of our project were addressed.

Professor Hartzer in Berlin who is well-known in Göttingen thanks to his monument for Wöhler and several felicitious busts of famous professors provided a model which found the vivid acclamation of the committee.[12] I would like to express our gratitude and admiration to the highly esteemed sculptor, who unfortunately due to illness could not join us today.

One agreed to indicate only very slightly the age difference between Gauss and Weber and represent the two men in their prime. The theme which unites the two figures to a group should have a connection to their most popular achievement, the invention of the telegraph. The company Gladenbeck in Friedrichshafen carried out the ore casting. The

[11] [Note by AKTA:] Prince Albert of Prussia (1837-1906) was a Prussian general field marshal and regent of the Duchy of Brunswick from 1885 until his death.

[12] Carl Ferdinand Hartzer (1838-1906) was a German sculptor. Friedrich Wöhler (1800-1882) was a German chemist.

place where the monument is erected, was kindly offered to us by the municipal colleges of Göttingen. It agrees with the wishes of the sculptor and we are very pleased with it, since it is amidst the mathematical, physical and astronomical Institutes of the University, when the new buildings are built as planned.

Now the statues of Gauss and Weber are ready to enter the town where the two men carried out their beneficial work. Fluttering flags and green wreaths are greeting them. The dear, eagerly awaited sun waits to gild them. Esteemed guests, representatives of the town, the University, and the student body are waiting to pay homage to them. Unwrap them and Handel's eternally youthful song of victory may greet those to come![13]

> (While the covers drop slowly the orchestra intones the melody "See, the conquering hero comes" from Handel's Judas Maccabaeus. The participants stand up from their seats, the students from the academic deputations have drawn their rapiers and greet with them as with the flags of the corporations.)

A song of victory is greeting those to come!

They deserve to be honored as heros, then heros of the mind are the men, who fought for the powerful position of our country in the realm of science. After the dreadful devastations of the great war it seemed for centuries that in Germany there will never be intellectual giants. In the same time where Italy, France, England, and the Netherlands gained immortal fame in the exact sciences up to a few exceptions everything was dead here. With C. Fr. Gauss a new, better time starts and Bessel, Jacobi, Dirichlet, Weber, Neumann, Helmholtz, Clausius, Kirchhoff build together with him the intellectual army, which fought for our powerful scientific position in the world.[14]

My fellows! You are entrusted with the heritage of these intellectual giants. Honor it together with the heritage of our political and war heroes!

Whoever attended a scientific meeting of Italian, French, English or even Dutch scientists was surely moved by the feeling of the glorious scientific history of their countries which exalts these men. Germany entered centuries after these countries into the competition. There is still a long way to go until it achieves parity with their predecessors or even gets ahead of them.

Genius is a present which is thrown into the lap of the people as well as the individual. What the individual as the people by its will can do for science, this is to prepare the ground that the precious seed of genius can develop if it is given to it. This is a holy task for everybody of you. Foster the scientific spirit in whatever position your life leads you, so that when a fortunate circumstance sends the genius among us, this can freely and powerfully swing its wings.

I would like to address you as well my esteemed fellow citizens as their coworker I feel myself with pleasure and pride.

If the name of Göttingen is more famous than the one of other towns of the same size, if Göttingen appears as a noble blossom in the wreath of German towns, then this is due to the scientific work which is done inside its walls. Take care that such work can be continued here. Do not consider it as a waste of public funds to host the University and the growing number

[13] [Note by AKTA:] George Frideric Handel was a German-Britisch composer.

[14] [Note by AKTA:] Friedrich Wilhelm Bessel (1784-1846), Carl Gustav Jacob Jacobi (1804-1851), Peter Gustav Lejeune Dirichlet (1805-1859), Franz Ernst Neumann (1798-1895), Rudolf Clausius (1822-1888) and Gustav Kirchhoff (1824-1887) were German scientists.

of Institutes. The wealth of this town is strongly connected to science and the University. The monument which we just uncovered may bring this to mind.

Thus I hand over in the name and mandate of the committee the monument of Gauss and Weber to the town of Göttingen as a memorial to two of its most splendid citizens, as a symbol of scientific work which joins countries and people, as an ornament and jewel of our beloved town which is our cozy home.

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