

# Heinrich Christian Schumacher - astronomer and geodesist

Tõnu Viik

## 1. Background

On September 3, 2010 there was 230 years from the birth of famous Danish-German astronomer Heinrich Christian Schumacher (further Schumacher). He was born in a small town of Bramstedt, located in Holstein which belonged to Denmark at that time. His father Andreas Schumacher was Amtmann in Segeberg, representing the government in the region.



*Andreas Schumacher*

Schumacher's father who was the son of Paul Gerhard Schumacher, the accountant of the Copenhagen insurance company, was extremely well



*Heinrich Christian Schumacher (Christian Albert Jensen maal, 1839)*

educated, was endowed with a good literary gift and made a quick and brilliant career.

While he was working in the German office in Copenhagen, the Danish minister of foreign affairs Johann Hartwig Ernst Count von Bernstorff (later Prime minister) put an eye on him. Andreas Schumacher rose quickly to post of the Danish Embassy secretary in St Petersburg, not without the help of the Count but he lost the post as quickly when Johann Friedrich Struensee - the doctor of psychically unstable King Christian VII started to intrigue against him. He remained secretary of the King's cabinet, a position which required special tact from him. He accompanied the King during his trip to England when Andreas Schumacher received the title of "doctor honoris causa" from Cambridge University.

After Struensee has exercised quasi-full power in Denmark for ten months - he

was the lover of Queen Caroline Matilda (the danish people called



*Johann Georg Repsold*

princess Louise Augusta, born in 1771, "the little Struensee") the Danish aristocracy lost their patience: Struensee was arrested and put to death. For some time Andreas Schumacher was given back his post but then he was sent to Segeberg as Amtmann.

Schumacher's father had married the 27-year-old widow of Oldenburg-Bentinck court councillor Johann Wilhelm Büsching - Sophia Hedevig Rebecca (néé Weddi). They had two sons, the first was Heinrich Christian Schumacher, born on September 3rd, 1780 and then Andreas Anton Friedrich who became a Captain in the Danish army and commander of its artillery and even made some inventions in ballistics but who died at the age of 41. Schumacher's brother had a son Christian Andreas and Schumacher sent him to study at the workshop of the German astronomer and precision mechanic Johann Georg Repsold for three years. Christian Andreas also became an officer in the Danish army and later participated in the Danish geodetic measurements; then he was active in Pulkovo for some time, took also part in the I Schleswig war and died at the age of 44.

Schumacher himself wrote later that when he was seven years old he was introduced to the Duke of Holstein and to the Crown prince of Denmark who later became King Frederick VI. Evidently the Prince was very impressed since he remained Schumacher's protector up to his death in 1839

## **2. Studies**

The boys' father died when they were respectively 9 and 8 years old. The father had taken care of their primary education and he had entrusted them to pastor Johann Friedrich August Dörfer, bearer of the order of Dannebrog who had gained fame by participating in the land survey of Schleswig-Holstein. Schumacher was thankful to him throughout his life. Since pastor Dörfer had been assigned to a church in Altona, the connection between him and the Schumacher family must have been the reason why the mother together with her sons moved to Altona, too. The boys began to study at the Christianeum gymnasium. That was the school where Jacob Struve - the father of Wilhelm Struve - started to teach in 1791 and became its principal three years later. Since Schumacher's father had been a lawyer, the same profession was projected also for him and from 1799 to 1804 he read law partly at Kiel, partly at Göttingen universities. In Göttingen he obtained his PhD degree and although he even published some papers in law, e.g. "*Disputationum juridicarum specimen*" and "*De servis publicis populi Romani*" in 1806, he started to devote himself to mathematics.

Nevertheless he accepted the post of law Dozent at Tartu (then Dorpat) university. Before that he had worked as a tutor in the family of Alexander Magnus von Meiners - the owner of the Laatre (then Fölk) knight manor and the assessor of the civil department. This activity ended in a very sad way for Schumacher since he was accustomed to bring along his shotgun during his walks. On such an occasion he accidentally shot at his master's thatched haybarn which burnt down to ashes.

What led Schumacher to accept a post at an university of a foreign country?

In order to answer this question we have to go back in the past. At the time

when Jacob Struve went to study at Göttingen university, Christian Gottlob Heyne was the teaching retorics and other classical disciplines there. Beside Jacob, his favourite student was Adam Christian Gaspari who came to Tartu in 1803 where he was elected as professor of history, geography and statistics (later also he became the rector of the university). He was the man who recommended Jakob's elder son Karl Ludwig to become a tutor and private Dozent in Tartu in 1805. Besides, Gaspari had married the niece of Jacob's wife Maria Emerentia. Since Jacob had helped Schumacher to emigrate, then this was evidently one of the reasons why Schumacher and Wilhelm Struve became friends.

In Tartu professor of mathematics and astronomy Johann Wilhelm Andreas Pfaff and extraordinary professor of astronomy Ernst Christoph Friedrich Knorre convinced Schumacher to practise mathematics and astronomy.

But there were many reasons why Schumacher did not actually start his work at the university as law Dozent. And then the king of Denmark Christian VII who had not forgotten Schumacher called him back to Copenhagen to work at the Rentenkammer (state treasury) in 1807.

### **3. Work begins**

Because of an attack of the British navy against Copenhagen, Schumacher could not take the post had been given. However, he was given a promise that the chair of astronomy at the Copenhagen university was kept free for him.

Schumacher went back to Altona and started to translate Carnot's "Géométrie de position". This period includes two very important events in Schumacher's life - he got acquainted with the chief of Hamburg fire brigade and keen amateur astronomer Johann Georg Repsold and he started corresponding with the director of Göttingen observatory, the "king of mathematicians", Carl Friedrich Gauss.

On the instigation of the privy state minister Christian Ditlev Frederik Count Reventlow and politician Ernst Heinrich von Schimmelmann, the king gave Schumacher 600 thalers so he could study astronomy for one year.



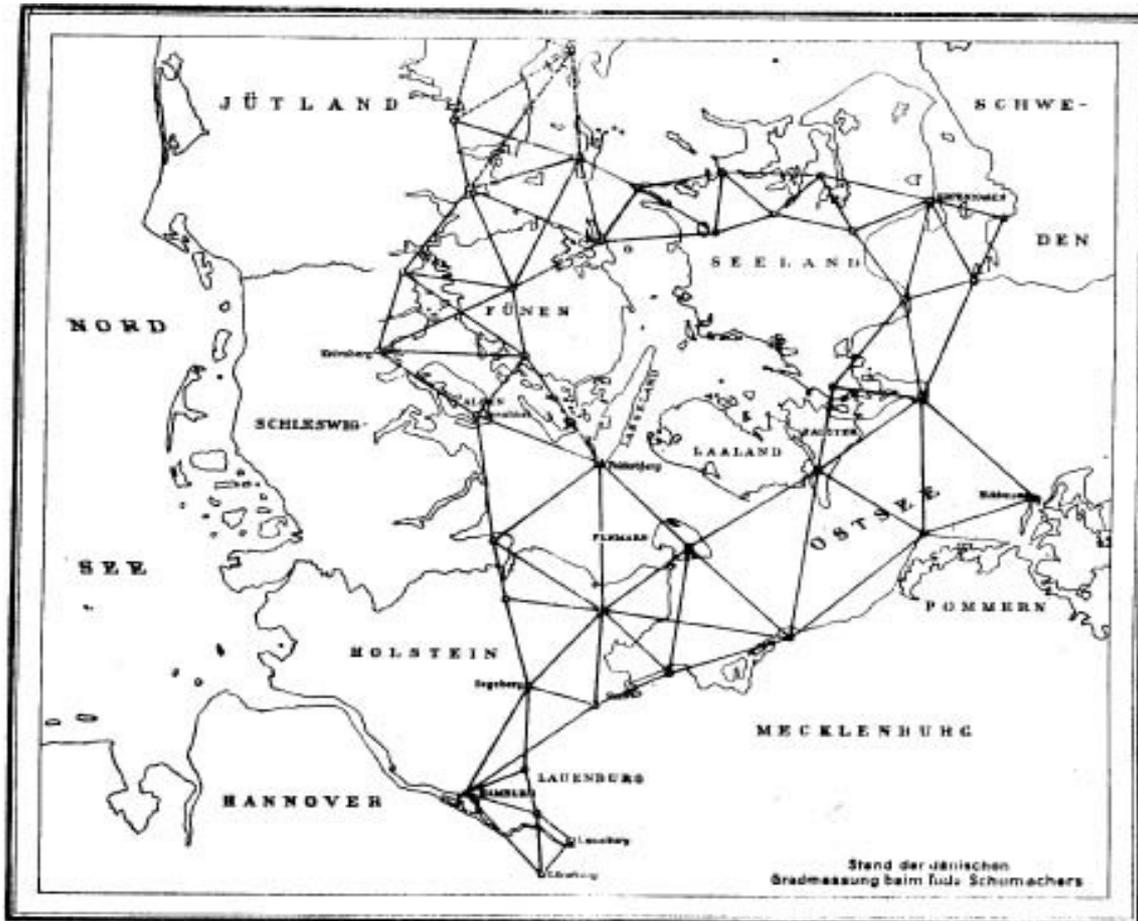
*Carl Friedrich Gauss*

Schumacher wrote immediately about it to Gauss, asking his permission to come for his studies to Göttingen. Gauss gave gladly his consent.

In 1808 Schumacher went to Göttingen to study astronomy under Gauss who in the first place aroused his interest in geodesy. His studies lasted until 1809; then all his money had been spent but the king refused to grant him another allowance. Schumacher together with Gauss went on a trip around the European observatories. They visited Paris, after that Bremen where they met Heinrich Wilhelm Matthäus Olbers. Later they went to Lilienthal to visit the observatory of Johann Hieronymus Schröter, where Friedrich Wilhelm Bessel was working. This trip was extremely important since Schumacher made the acquaintance of almost all renowned astronomers in Europe at that time.

After this trip the Schumacher's undefined situation continued, until in 1810 he was informed that the position of extraordinary professor of astronomy at Copenhagen University was free for him. Regrettably he could not go there since professor of astronomy Thomas Bugge expressed clearly his wish to

have nobody at his side.



*Triangulation net in Denmark*

Nothing was left to Schumacher but the post of observer at the Repsold observatory in Hamburg where he started a three-year programme of observation of circumpolar stars with the meridian circle. This matched excellently with the fact that Repsold himself was more and more engaged in building astronomical instruments. In Hamburg Schumacher obtained a flat at Herrengraber 12, which was nicely located close to the observatory at Millerntor. Though Schumacher and Repsold had different characters, they soon became friends so that when Repsold perished during extinguishing a fire in January 1830 Schumacher acted as foster-father for his sons.

#### 4. Geodetical activities

Observations lasted up to 1811 when the French occupational forces started to reinforce the Hamburg wall so that the Albertus bastion where the Repsold observatory was located, had to be demolished for the French wanted to build a new fortification. Thus Schumacher lost his job and tried to find a new one at the planned Norwegian university which included the project of an observatory. Perhaps for the fact that he proposed to found the observatory in Königsberg, he did not get the job. Schumacher was very glad when Gauss found him the post of director at the Mannheim observatory. Copenhagen allowed him to go there only on one condition - that he should return immediately after Thomas Bugge's death. Schumacher travelled to Mannheim together with his mother and wife. The Mannheim observatory founded by Prince elector Carl Theodor in 1772 was in a sad condition but Schumacher arranged the situation in such a way that he could start his observations. But his directorship ended after two years when Copenhagen informed him that Bugge had died. In July 1815 Schumacher went to Copenhagen. The observatory in Copenhagen - the so-called Round Tower or in Danish "Rundetårn" was in a sad condition, too, as Schumacher wrote "eine der erbärmlichsten Europas". This tower had been built in 1642 by king Christian IV, following the example of Tycho Brahe's observatory "Stjerneborg" on Hven island. The tower was 15 m in diameter and almost 40 m high. What makes this tower so special is the fact that the king wanted to drive to the top of the tower in a coach - the spiral rampway was 210 m long.

The activities of Schumacher in the Round Tower were shortlived, though, because he asked permission from the king to start triangulation works between Skagen and Lauenburg. He succeeded in arousing the king's interest and received the permission to measure the longitude of a 4.33 degree arc on the condition that he would also measure the arc from Copenhagen to the western coast of Jylland, altogether 4.67 degrees.

Why the king agreed upon such a plan and founded the project “Den danske Gradmaaling”? Firstly, in connection with the development of economy and in



*Round Tower in Copenhagen*

particular, because the army required very accurate topographical maps. Maps of this kind were compiled in other European states and Denmark could not lag behind. Especially when we take into account the centuries-long quarrel of Denmark and Prussia over Schleswig and Holstein. Secondly, Schumacher was a brilliant diplomat and the king regarded him as a friend.

In June 1816 Schumacher made preparations for the measurements, though the instruments ordered from Georg Friedrich von Reichenbach in Munich had not arrived yet. The work started with some delay and Schumacher installed the signals. Two of them were remarkable - the spire of Michaelis church in Hamburg and one of the spires of Maria church in Lübeck. In order to measure the baseline Repsold had made a special instrument and a level ground was found near the village of Braak (close to Ahrensburg). The chosen baseline was well situated since it could be easily connected with the Hannover triangulation. Bernhard August von Lindenau from the Seeberg observatory

together with Gauss had planned to measure the meridian arc from Hannover to Gotha in order to connect it to the Bayer measurements. Since the Hannover kingdom was in a union with England then obtaining the needed permission took a long time. At last the new king, Georg IV, signed the permission in May, 1820.

The measurement of the Braak baseline gave as a result 1800.876 meters with an error of 3.6 mm.

In the Schumacher's team there were many well-known persons - the later vice-admiral of the Danish navy Christian Christopher Zahrtmann, the later director of Tartu observatory Thomas Clausen and the later renowned researcher of the Moon's movement, Danish astronomer Peter Andreas Hansen. Gauss and Repsold were present, too, and even F.G.W. Struve visited the site when he came to see his parents in Altona. We are strongly convinced that Struve found there a confirmation for his grand projects of arc measurements here. Schumacher had employed two officers of the Danish army because, as he stated, their uniforms impressed the farmers and that some military regulations were not bad at all.

In order to measure the baseline one should know the accurate geographical coordinates of at least one endpoint. The respective latitude can be found by measuring the altitude of pole and the longitude by marking the exact moment when a star passed the meridian. So Schumacher had to deal with these astronomical observations. Field work badly affected the already weak health of Schumacher because he had to travel a lot between triangulation points, Copenhagen and Altona. When he was not far from Altona, he often stayed at Conrad Hinrich Donner's place in Neumühlen who was a big merchant. In spite of the exacting work at arc measurement Schumacher was also active in publishing. He published some auxiliary tables and ephemerides for navigation in 1820/21.

## 5. The founding of the journal and the Altona observatory

A great moment arrived in Schumacer's life when the Danish minister of finances Johan Sigismund von Mösting charged him to found an

# ASTRONOMISCHE NACHRICHTEN

herausgegeben

von

H. C. Schumacher, Ritter vom Dannebrog,

ordentl. Professor der Astronomie in Copenhagen, Mitglied der Königlichen Gesellschaften der Wissenschaften in Copenhagen, Neapel, London und Edinburgh, der astronomischen Gesellschaft in London, und der Königlichen Landbauhaltungs-gesellschaft in Copenhagen, Ehrenmitglied der Society of useful arts in Edinburgh.



Erster Band.

mit 3 Kupfern, 9 Beilagen, und einem Register.

---

Altona 1823.

gedruckt in der Hammerich- und Heinseling'schen Buchdruckerei.

*The title page of the first issue of Astronomische Nachrichten*

astronomical journal, promising that the government would foot the bills. So Schumacher founded the journal "Astronomische Nachrichten", which is still published nowadays, thus being the oldest continuously appearing astronomical journal in the world (the British journal "Monthly Notices of the Royal Astronomical Society" started to appear only in 1827 while the first issue of AN appeared already in 1823). In 1837, as a homage to Mösting, Johann

Heinrich Mädler named after him a crater on the Moon not far from the centre of its disk. Clearly was Schumacher the right man to publish an astronomical journal since he knew almost all famous astronomers of that time. Though the journal was founded in 1821 the first issue came out only in 1823. The journal was very well accepted and became quickly a highly valued mouthpiece of astronomers. An important part of its popularity came from the fact that Gauss, Bessel, Carl Ludwig Christian Rümker, Olbers, Johann Franz Encke, George Biddell Airy, Friedrich Wilhelm and Caroline Lucretia Herschel published often their papers in this journal.

On top of all this work Schumacher was assigned the task to compile a topographical map of the Holstein duchy in its utmost details. This was already a big load for Schumacher, his burden got even heavier – he had to compile a similar map for the Hamburg region. He completed also the map of Altona in scale 1:4000.

Because of all these tasks Schumacher could only seldom visit Copenhagen he applied for a permission of the king to live in Altona. The permission was given in 1821 but on the condition that he should go to Copenhagen at least once a year and report about his activities. The Danish government purchased a house for him in the southern part of Altona on the corner of Palmaille street and van der Smissens boulevard. In november 1821 he invited Gauss as the very first guest to his house. It was well known that Schumacher liked to invite guests and usually many of them enjoyed the food and good wines from his own cellar.

As a next step Schumacher started to construct an observatory in his back-garden. He employed as construction master Kessels who had also built the first observatory in Hamburg (this master was a brother of the known chronometer maker Heinrich Johannes Kessels). The foundation was laid for the Reichenbach meridian circle and the pillars were erected in 1822.

It is interesting to point out that two good friends - Schumacher and Repsold - started to build their observatories at the same time - one in Altona and the other in Hamburg.

The observatory founded by Schumacher did not remain only as a place for astronomical observations but on the proposal of Gauss, geomagnetic observations were also started there in 1835. One can say that the Danish



*Schumacher's house in Altona*

system of measures was established on solid foundation by Schumacher since he began the measurements with a second pendulum in Gldenstein castle near Lensahn (it must be mentioned that the development of the system of measures was left unfinished).

Together with Argelander, Bessel and Encke, Schumacher took part in the expedition organized by the Russian general staff in 1833 in order to establish the difference of the geographical longitudes of some essential points on the coast of the Baltic sea by using chronometers.

## 6. The final lifeyears

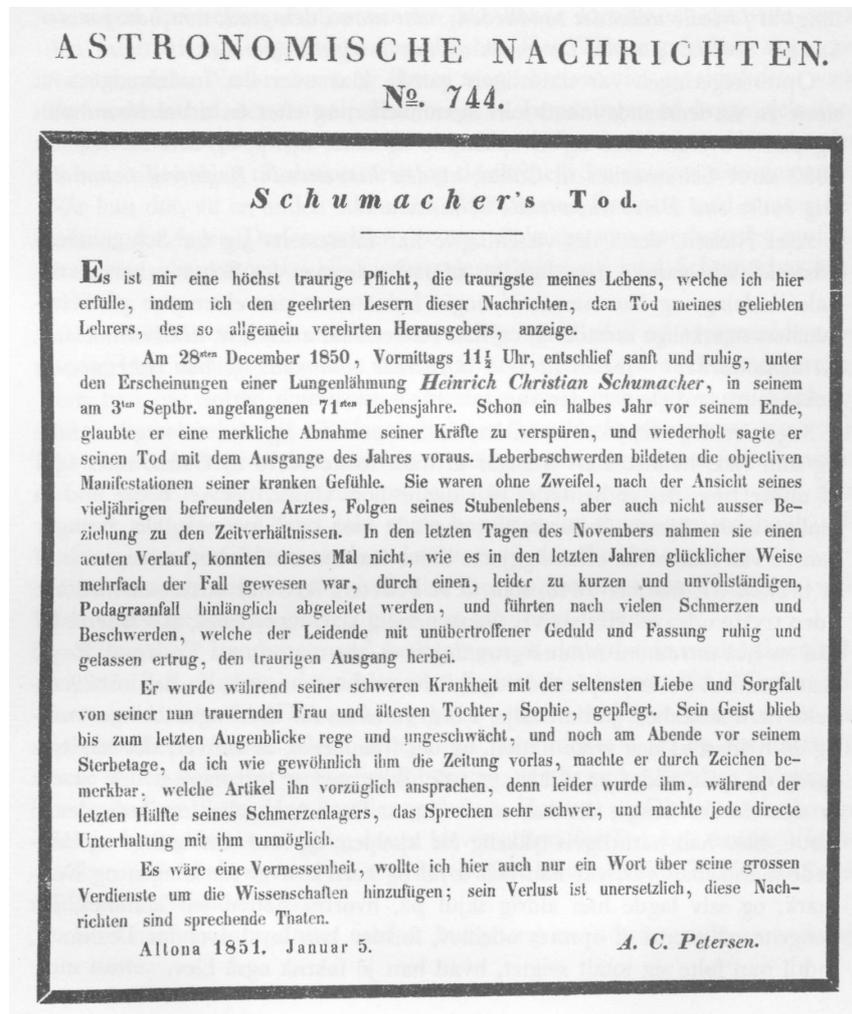
The activities of Schumacher did not escape the king's attention - he was awarded the title of Knight of the Dannebrog order and then of the Commander of the same order. In 1828 king Frederick VI appointed him state councillor and in 1840 conference councillor (konferensråd). In addition to that he was elected member of more than 20 scientific societies, among them the Swedish academy of sciences in 1827. In 1830 he was awarded the gold medal of the Royal Astronomical Society together with William Pearson and Bessel.

In 1839 Schumacher was hit by a heavy blow - his patron king Frederick VI died. And even if his descendant Christian VIII showed some benevolence toward Schumacher, the king cut by half the sums budgeted for the arc measurements. This decision did not touch Schumacher personally since the Danish parliament (landsting) had granted him a lifelong pension.

In addition to this cut the king contemplated a plan to invite Schumacher back to Copenhagen. Schumacher did not like the idea and his friends and relatives started a campaign trying to avert this decision. But before this campaign gave any results much more grim events took place.

As is known Denmark and Prussia were in a constant quarrel over Schleswig and Holstein. In 1815 the Vienna congress decided to give the Lauenburg duchy to Denmark. Nationally inclined Danes also called the Eider Danes (Ejderdanske) because they wanted the Denmark's southern border to be on the Ejder river, claimed Schleswig as part of Denmark. In 1846 king Christian VIII changed the hereditary right in his open letter which allowed the Ejderdanske to take over the power in 1848. As a response the Prussians formed a provisional government in Kiel. And the armies of Prussia and Hannover marched into Holstein. The so-called I Schleswig war had started. Schumacher had always been a loyal subject of the Danish king trying to keep himself as far of politics as possible but now he was in the centre of the war

since the Schleswig volunteers had their quarters in Schumacher's house. His friends helped him to continue his work but actually he was a prisoner in four walls. Moreover, he had no money to continue the publishing of *Astronomische Nachrichten* or maintain the observations.



### *A.C. Petersen's note about the death of Schumacher*

All that impaired his already weak health and Schumacher died on his 71<sup>st</sup> year surrounded by his family on December 28th, 1850. He was buried in the cemetery of the Holy Spirit church on his home street.

## **7. The family**

Schumacher had married the daughter of senator Jens Georg Eggert von Schoon Christine Magdalena von Schoon in 1813. They had four sons and three daughters - Heinrich Andreas, Johannes, Sophie, Marie, Richard,

Sigismund Wilhelm and Johanna. Among them, Sigismund Wilhelm died when he was less than a year old.

Among Schumacher's descendants, two of his sons were more or less connected with astronomy - Johannes, who later became an artist, and Richard. Together with Johannes, Schumacher visited Vienna in order to observe the total solar eclipse in July 1842. That trip was financed by the king himself. During the eclipse Schumacher observed some bright light around the eclipsed solar disk. He supposed that this light was the reflection of the glaciers on the Moon. Actually this was the first registered observation of the Sun's protuberances. Schumacher taught at home his other son Richard (1827-1902) who never received any official higher education. Richard was Schumacher's assistant in Altona observatory from 1844 until his father's death. Thereafter, he became the assistant of the director of the observatory of Santiago de Chile Carlos Guillermo Moesta and he was active in compiling the geodetic review of Chile. He came back to Europe in 1869 where he was an assistant in Altona and later in Kiel observatory.

Schumacher's nephew Christian Andreas was active in geodetic measurement of Denmark during 1833-1838. Later he worked in Pulkovo (1844-1845).

## **8. Connection with Estonia**

How was Schumacher connected with Estonia beside of the burnt haybarn and a couple of years spent in Tartu where his relations with Pfaff and Knorre had layed a firm foundation to his interest in astronomy? Such a connection really exists. In the first place through Wilhelm Struve whose father had been Schumacher's teacher in Christianeum. The connection with Struve persisted even after Struve had gone to Tartu, as every time Struve visited his parents in Altona, he also visited Schumacher. True enough, he attached these visits to his official tasks and the university financed his trips according to Pfaff's proposals. This was substantiated by the fact that he was infected by the bug of geodesy, which raised him among the greatest geodesists of the world,

during the Braak baseline measurements and watching the doings of Schumacher and Gauss.

Another essential link with Estonia is through the director of Tartu observatory and professor of astronomy at Tartu university Thomas Clausen who was a native of northern Schleswig. The talented boy had been educated by priest Holst who recommended him to Schumacher who was measuring the arc near their village. Schumacher took the boy to work for him and being convinced that he could entrust him, he gave him to solve some easier mathematical problems. Quite soon Clausen started to solve more serious problems and presented a method to measure the geographical latitude by using the occultation of a star by the Moon. When Olbers praised this work, Schumacher hired a room in Altona for him and gave him some astronomical problems to solve. Schumacher introduced Clausen to Gauss when he was near Altona in connection with the Hannover arc measurements in 1824.

Nevertheless the relations between these two men were not to remain so good since Clausen, unlike Schumacher who belonged to Denmark's high society, lacked the proper "Kinderstube". A couple of unpleasant events connected with the fact that he did not speak well of his master to Norwegian astronomer and geodesist Christopher Hansteen and the man reported all that to Schumacher, plus Clausen's disrespect toward the same Hansteen and the breaking of an expensive barometer gave Schumacher the ground to fire Clausen. However, he backed on this decision when Gauss applied for Clausen. Schumacher helped Clausen to find work at the Fraunhofer institution in Munich and later in Tartu. True, this help was conditioned by the fact that "Habenichts" Clausen had started to show deep interest in Schumacher's niece and that could not be tolerated. The Schumacher's student Thomas Clausen was elected professor of astronomy at Tartu university after Johann Heinrich Mädler and he stayed at this post from 1842 up to 1872.

There is a third link, too, though indirect. Namely, the son of the Tartu astronomer Ernst Christoph Knorre, the astronomer of the Russian Black Sea Fleet Karl Friedrich Knorre visited Schumacher in Altona at the time of his

extensive information tour of European observatories.

## **8. Conclusion**

Without any doubt, Heinrich Christian Schumacher was an outstanding person. Having received an education in law he was taken to exact sciences, choosing from them astronomy. In all likelihood we see here the influence of Johann Wilhelm Andreas Pfaff and Ernst Christoph Friedrich Knorre. Schumacher did not make any discoveries or found any fundamental theories, but yet his name is written alongside the names of illustrious astronomers, above all by founding the journal "Astronomische Nachrichten" and being its long-time editor.

Looking from Estonia, it is extraordinary odd that three renowned astronomers tightly connected with Estonia - Heinrich Christian Schumacher, Friedrich Georg Wilhelm Struve and Thomas Clausen - have their origin in Schleswig-Holstein!

## **Acknowledgement**

I am very thankful to Dr. Axel Wittmann of Göttingen, who helped me to obtain information about Schumacher, and Ms Suzanne Héral of Canohès (France), for linguistic help.

## References

1. G.Wolfschmidt, Heinrich Christian Schumacher: Gründer der Altonaer Sternwarte,  
<http://www.friedensblitz.de/sterne/schumacher/Schumacher.html>
2. W. Voss, H.C. Schumacher and the observatory at Altona, Journal of the Royal Astronomical Society of Canada, vol. 46, p.22, 1952.
3. <http://www.hf.uio.no/iakh/om-instituttet/ansatte/vit/vidaren/filer/Enebakk%20&%20Pettersen%202009.pdf>
4. [http://books.google.ee/books?id=O2NCWXb-UcsC&pg=PA78&lpg=PA78&dq=heinrich+christian+schumacher&source=bl&ots=8ePx5bGIpU&sig=WY7vL47H1HB-YF0dAEWMfyEONx8&hl=et&ei=vBlkS6m\\_HcOF-QbOluWrBw&sa=X&oi=book\\_result&ct=result&resnum=7&ved=0CB4Q6AEwBjgy#v=onepage&q=heinrich%20christian%20%20schumacher&f=false](http://books.google.ee/books?id=O2NCWXb-UcsC&pg=PA78&lpg=PA78&dq=heinrich+christian+schumacher&source=bl&ots=8ePx5bGIpU&sig=WY7vL47H1HB-YF0dAEWMfyEONx8&hl=et&ei=vBlkS6m_HcOF-QbOluWrBw&sa=X&oi=book_result&ct=result&resnum=7&ved=0CB4Q6AEwBjgy#v=onepage&q=heinrich%20christian%20%20schumacher&f=false) (Abeli eksitus)
5. [http://www.lpi.usra.edu/resources/lunar\\_orbiter/images/img/iv\\_062\\_h2.jpg](http://www.lpi.usra.edu/resources/lunar_orbiter/images/img/iv_062_h2.jpg)
6. K.-R. Biermann, Zur Herausgabe des Briefwechsels Alexander von Humboldts mit Heinrich Christian Schumacher. Astronomische Nachrichten, Band 300, Heft 6 (1979).
7. L. Dubjeva, Adam Christian Gaspari. TRAMES, 13 (63/58),2, 153-172.
8. L. Brandt, Heinrich Christian Schumacher zum zweihundertsten Geburtstag. Heimatkundlichen Jahrbuch des Kreises Segeberg, S.45, 1980.
9. T. Viik, F.G.W. Struve Tartu period, 2000,  
[http://www.aai.ee/~viik/VIK\\_STRUVE\\_ARC\\_REPORT.pdf](http://www.aai.ee/~viik/VIK_STRUVE_ARC_REPORT.pdf)
10. F. Lühning, Die Altonaer Strenwarte 1822-1850. Mitteilungen der Gauss-Gesellschaft e.V. Göttingen, 46, pp. 7-20, 2009.
11. <http://www.mois.ee/kihel/sangaste.shtml>

12. Ch.F.R. Olufsen, Biographische Notizen über den verstorbenen Conferenzzrath Schumacher. *Astronomische Nachrichten*, 36, p. 393, 1851.
13. E. Andersen, Heinrich Christian Schumacher: Et Mindeskrift. Geodaetisk Instituts Forlag, København, 1975.
14. G.I.Pinigin, S.F. Héral. Dynasty of Knorre astronomers, Nikolaev, 2009 (in Russian).