

## Chapter 2

# Carl Størmer's Origins

Carl Størmer was the only child of *Georg Ludvig Størmer* (1842–1930) and Elisabeth Amalie Johanne *Henriette Mülertz* (1844–1916). They married on June 4, 1872 in Eidanger, the small municipality where Henriette grew up. Eidanger and Skien are nearby towns in Norway's Telemark County about 150 km southwest of Oslo. Carl's paternal grandfather, Christian Fredrik Størmer was a prosperous shopkeeper in Trondheim. His maternal grandfather, Fredrik Carl Mülertz, was a well-known vicar in Eidanger. From 1783 to 1856, the Mülertz family owned and operated Telemark County's only pharmacy that had been established in 1704. The business was financially prosperous and by prevailing standards the Mülertz family was wealthy (Fig. 2.1).

Georg Ludvig Størmer was born in Trondheim, Norway's third largest city, about 500 km north of Oslo. After graduating from the regular Latin High School in 1858, he began an apprenticeship at a local pharmacy. There he remained until 1863 when he passed the first examination required to become an officially sanctioned pharmacist. At the time no formal university studies in pharmacology were required. Georg subsequently transferred to another local pharmacy to obtain training as a pharmaceutical chemist. He then moved to Kristiania. On May 12, 1865 he passed the final pharmacist examination. Although he had completed all formal testing, he still needed government certification to become an officially recognized pharmacist. Georg continued to work as a pharmacist in Kristiania for 3 more years before moving to Skien, in Telemark where on October 16, 1871 he received formal permission to operate his own pharmacy.

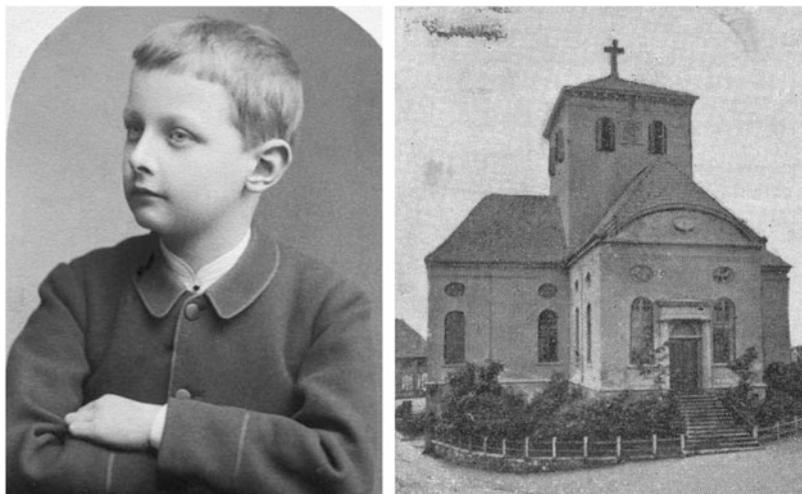
On October 31, 1871, shortly before getting married, he purchased the "Skien's Pharmacy & Chemistry Shop" at 17 Prinsens Street. For generations this pharmacy had been owned by the Mülertz family. Through the marriage to Henriette, the sole heiress to the Mülertz estate, Georg continued this long family tradition. The purchase included the complete collection of furniture and medicine, as well as a large garden and two small apartment houses. The purchase price of NKr. 120,000 then represented serious money. For comparison, in 1900 the maximum annual salary of a professor at the University of Kristiania was about NKr. 5,000.



**Fig. 2.1** Photographs of *Georg Ludvig* and *Elisabeth Amalie Johanne Henriette Mülertz Størmer*, Carl Størmer's parents, taken around 1910

Henriette's family must have played important roles in getting their pharmacy business started. The young Størmer family remained in Skien for 15 years, enjoying a comfortable income from their pharmacy business and rental properties. Because the Skien pharmacy shop was fairly small, Georg built several additions to the old house. During his years running the pharmacy in Skien, Georg became actively involved with The Norwegian Pharmacy Association and wrote several small articles for its newsletter. Eventually, Georg and Henriette decided that it would be advantageous for both their business and their son's education to return to Kristiania. On November 10, 1885, they sold the pharmacy shop for NKr. 100,000, but retained ownership of the two rental houses. Less than a year later the pharmacy burned to the ground in the devastating Skien-fire of 1886.

In the summer of 1886 they moved to 9 Huitfeldtsgate in Kristiania, close to the Royal Palace. In September 1892 Georg obtained official permission to open the new Hebe Pharmacy at Åkeberg Road 24, in a working-class area, in the eastern part of Kristiania. Some local pharmacists were upset, fearing that Kristiania already had more than enough pharmacies. Nonetheless, Georg persisted and soon rose to high positions within The Norwegian Pharmacy Association. He was elected a member of the Pharmacy board, first as treasurer then as vice-president. In 1910 he became president. He represented the Association at national and international meetings in Scandinavia and Europe: Georg made a point to pay the costs of his official travel, never asking the Union or the Government for reimbursement. As president Georg Ludvig Størmer wrote several articles about the Norwegian Pharmacy business in *Apotheker-væsenet* and gave lectures on the organisation's future development. He was particularly upset when in 1904 the government levied and added another tax on pharmacy owners. In 1913 he was appointed a member of a Government committee assigned to reorganise the education of pharmacists and assure the quality of their operations. In 1920, after 28 years in the business, Georg sold the Hebe Pharmacy at a considerable profit.



**Fig. 2.2** *Left:* photograph of Carl as a 12-year old boy. *Right:* the old church in Skien where Carl was baptized in December 1874

Carl's mother, Elisabeth Amalie Johanne Henriette Størmer was born in Fyresdal, Telemark less than 100 km from Skien. She was a very social person with many friends. She loved cultural events and never missed a premier at the National Theatre in Kristiania. In 1883 the young artist Edvard Munch (1863–1944) gave the first public exposition of his work in Kristiania. In time Munch would be recognized as one of the great expressionist artists of the twentieth century. However, contemporary critics felt otherwise. Henriette knew artistic talent when she saw it. For the equivalent of a few dollars she purchased a couple of small Munch drawings, one of a familiar scene in Bygdø. In 1888 she bought another of Munch's drawing. To this day the Munch drawings remain among the Størmer family treasures.

Henriette took excellent care of the home and family. She wrote many letters to family and friends and in her diary commented on important family events. That she came from an important Norwegian family can also be deduced from the use of the "Mülertz" in Carl's baptismal name, an unusual practice at the time (Fig. 2.2).

Fredrik Carl Mülertz Størmer was born on September 3, 1874 in Skien. At his baptism he had four godfathers, all from the most influential families in town. The normal practice in contemporary Norway was to have two godfathers. Carl received several christening gifts and a special nurse was hired to take care of the child. She resided at the family's home until Carl started school. As an only child Carl enjoyed a close, life-long relationship with his mother, as is well documented in his diary and many letters to her. He mainly reserved discussions of complicated and controversial matters for his father, an astute businessman. For example, in a letter dated January 27, 1921 Georg Størmer provided serious financial advice to his 47 year old son:

*A rule never to be broken is that capital must never be reduced. Only profits from capital may be spent. A good rule is not to spend all of the profits. Capital itself must remain untouched. If you ever start to eat into capital, you have started down a road to bankruptcy. Always avoid debt!*

Each summer Carl's mother and father took him on long trips all over Norway, especially to the west-coast fjords where Henriette had relatives. His diary contains several notes and sketches from these vacation trips. During the trips Carl collected materials for his herbarium. Trips were often combined with his father's business travel to inspect drugstores all over the country. Carl started in Skien's local primary school on September 5, 1881. Two years later he entered Skien's grammar school (*Latinskolen*).

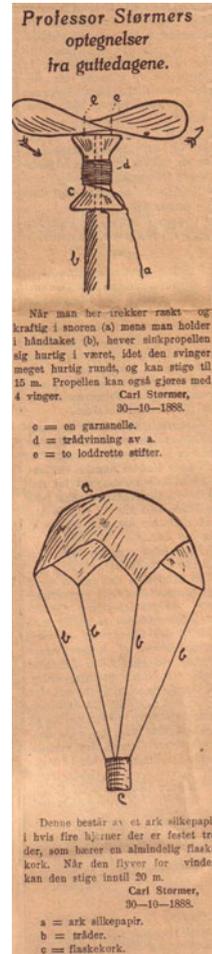
From childhood Carl showed a deep interest in mathematics, astronomy, chemistry, geology, meteorology and particularly in botany. His diary describes spending several nights during the autumn of 1887 tracking Fabry's comet. Shortly after moving to Kristiania, in June 1886 the 12-year old Carl started to receive private tutoring in mathematics from Heloise Lund. That summer he also began serious work with his first herbarium. On August 26, 1886 he started middle-school (*Middelskolen*) studies. He finished in July 1887 with a very good, but not an excellent grade average.

The March 7, 1925 issue of *Varden*, Skien's principal newspaper, carried an interview containing Professor Carl Størmer recollections of his first 12 years in Skien. He spoke of his interest in flowers, plants and astronomy. He also pointed to a growing interest in geology. He accompanied his father on trips to collect plants used in the manufacturing of medicinal drugs. He also went with his nurse or father to collect rock samples at mines scattered around the countryside. "Fortunately, my children have inherited my great interest in geology and botany", he wrote. One of his sons became a professor of geology and another of botany.

Carl's interest in botany was greatly stimulated during summer vacations when the family visited several of his father's colleagues and he saw their beautiful herbaria. He seriously collected plants and mushrooms for many years. Collecting plants and flowers that were not listed in botanical floras was his greatest challenge. His herbarium, which grew to include more than 1,000 specimens, was donated to the University Botanical Garden 10 years after his death (Chap. 5). In the interview Carl recalled Skien as a nice town to grow up. At the time most buildings in Skien were made of wood and were closely packed together. During winters, fires were a constant danger. He recalled one instance when the firemen could not find water to fight a fire. Resourcefully, they turned to a nearby dairy and were able to kill the fire with milk and cream.

From a later interview we learn that Carl told his uncle Fredrik Størmer, a prominent engineer and entrepreneur, that he would like to study mathematics. Fredrik subsequently introduced Carl to his first and second private tutors in mathematics, and to the Associate Professor of Mathematics, Elling Bolt Holst (1849–1915). As with Kristian Birkeland before him, Elling Holst found Carl to be an exceptional student. In one document, Carl wrote that after turning 16, he began taking a serious interest in mathematics, but loved botany still more. Before Carl finished high school in 1892, his father contacted Kristian Birkeland, then a research assistant at the University, seeking advice about his son's further education. During the 1890s both Birkeland and Holst, were often invited to dinner parties at the Størmer home (Sect. 2.5).

**Fig. 2.3** Copy of Carl Størmer's boyhood experiments and sketches that were published in Tidens Tegn during the 1930s. Together more than ten experiments and illustrations with explaining text, dating from when he was between 10 and 14, were published in this news paper



In 1886 when the Størmer family moved to 9 Huitfeldtsgate, in Kristiania they purchased three apartments in the same building, renting two of them to relatives and friends. From Carl's diary we know that they had a telephone installed in their home on January 11, 1893. From early in life Carl was aware of having been born into a wealthy family who enjoyed social gatherings with some of the leading families in Norway. When he was 12 years old, the well-known artist Lorentz Norber painted a large oil portrait of Carl (see Fig. 2.12). In 1915, Christian Krohg, then Norway's most famous artist, painted a second portrait (see Fig. 2.10). An oil painting of Carl Størmer by the well-known Norwegian painter Harald Brun still resides at The Mathematical Institute, University of Oslo. Finally, a sculpture of Carl Størmer, by another well-regarded Norwegian artist Ørnulf Bast stands at the University of Oslo's Astrophysical Institute. It was a gift from Øystein Ore, a former graduate student of Størmer, and then a member of Yale University's mathematics faculty. The early portraits are still prized by the Størmer family.

In a 1917 book called *Studentene (High School Graduates)* Carl wrote: *Before moving from Skien, I largely took care of myself and enjoyed science, particularly botany and astronomy. Every evening, when the weather was clear, I had the star map in front of me and learned to recognize different stars and planets from the map. I plotted their positions, sitting for several hours on the platform with paper, pen and a flash-light in hand. My only regret was that my father told me to become an astronomer I had to learn mathematics, which would be very difficult. That frightened me. Later, however, I came to a different understanding about learning mathematics.*

He reiterated how pleased he was with botany, and described experiments related to chemistry, physics and even building several small pieces of equipment and electrical devices. He carefully wrote down whatever he did and composed many sketches. Later, in the 1930s, he published several examples of his boyhood experiments and illustrations dating from when he was between 10 and 14 in *Tidens Tegn*. Carl's parents had someone watching over him nearly all the time. His mother was afraid of him hurting himself. Up to the time he was 12, his nurse was expected to chew fish before giving it to Carl, lest a bone stick in his throat.

## 2.1 High School

On August 26, 1887 Carl entered at the famed *Kristiania Katedralskolen*, the oldest high-school in Kristiania, founded in 1152. Originally it was a school for boys who planned to study theology in preparation for ministry in the Catholic Church. In 1869 the *Katedralskolen* moved to a new building, in *Akersgaten*, about a 15-min walk from Carl's home. It was then one of the few high schools where, after 1880 a student could choose to study science and modern languages instead of Latin. Thereafter the school gradually increased its emphasis on science and modern languages. It was an elite school that mainly catered to the sons of civil servants. During Carl's years girls were not allowed to attend *Katedralskolen*.

In the late nineteenth century *Katedralskolen* had a few hundred pupils in about 20 different classes. Latin was still regarded as a language of international discourse and was the major concentration of most students. Among the modern languages French and German were as widely known to Norwegians as English is today. Carl chose the science course and enjoyed his schooling, especially the science part of the curriculum. He graduated from high school in early July 1892 with the highest marks in all of the scientific disciplines, as shown in Table 2.1.

"Particularly, my interest in mathematics increased during my last 3 years of high school." The last year of high school he became very interested in trigonometric series and during that winter he met with Elling Holst once every week. Both he and his parents gladly acknowledged that Holst stimulated Carl's intense interest in mathematics. In March 1892 Professor Holst invited Carl to give a seminar to his University students on the topic "Summation of some trigonometric series," prior to

**Table 2.1** Størmer's cumulative grades on graduating from high school. The highest mark is 1, while the lowest passing grade is 4

Examination artium, 7th July 1892 for Fredrik Carl Mülertz Størmer			
Naturvid	1	Modersm. lit. and oldn.	1
Mathemat (mundtlig)	1	Religion	2
Geografi	1	Fysik skriftlig	1
Historie	1	Mathemat. skriftlig	1
Fransk	2	Engl. Stil	3
Modersmaal	3	Tegning	1

finishing high school. This was probably the only time that a high school pupil was invited to give a lecture at University of Oslo. His talk was printed in the journal of The Norwegian Academy of Science and Letters in 1892. His last publication appeared in the same journal 61 years later, in 1953.

Carl graduated from Kristiania *Katedralskolen* July 7, 1892. His diploma lists his full name, Fredrik Carl Mülertz Størmer. His grades, given in the Table 2.1 show he received very good marks in science, but in Norwegian and English his grades were not great. Still, his overall grade was: “*Udmerket Godt - Excellent.*”

During his years at *Katedralskolen*, Carl was active and popular. He was of less than average height. Even though he was not very fat, he was fairly heavy and did not participate much in outdoor sports. However, his diary from the summer 1889 describes daily walks in the forest mostly alone, but sometimes with his father. He even counted the steps on their walks, which on some days could reach 30,000. At this age he enjoyed dancing with the young girls. Dancing and trips through the woods looking for special flowers and/or rocks was more or less the only physical activity exercise he engaged in. We also note that his career as a clandestine photographer began during his high school years.

## 2.2 University Education and First Mathematics Papers

Entrance to the University of Kristiania involved more than filling out registration forms. New students had to spend several hours listening to formal speeches by the rector and deans. All new students received a document, indicating that they were now members of the academy, and as such promised to abide by University rules and regulations. In addition, there were several celebrations arranged by the student union. This was particularly important for Norwegians in those days because the country was poor, sparsely populated, and still in union with Sweden. The union with Sweden received a good deal of scrutiny in the 1890s, with many public demonstrations against it. Norway needed leaders with visions for the future and the intellectual discipline needed to achieve them and have internationally recognized impacts (Fig. 2.4).



**Fig. 2.4** The Royal Frederik University of Kristiania and the University Square as they looked when Carl Størmer was a student. Birkeland's terrella laboratory, which he visited often, was in the building behind the column façade (Photo: University in Oslo)

After 1851, passing a final examination called *Matematisk Naturvitenskapelig Lærereksamen*, was required for conferral of a degree that roughly approximates a masters today. Science courses under the Mathematics and Natural Science Faculty were divided into three main groups. To meet university requirements for graduation, a student had to pass examinations from two of the groups. Carl selected group I (mathematics, mechanics, geology and astronomy) and group III (botany, meteorology and geography). He then had to study the chosen subjects in depth for a full year. No written dissertation was required. In 1890s there were about 40 students within the Mathematics and Natural Science Faculty (Gran 1911). At the end of the nineteenth century having a university degree was uncommon in Norway.

On September 2, 1892, at the age of 18, Carl matriculated at The Royal Frederik University together with about 200 other students. Because Carl lived close by the University he stayed at home with his parents for the 6 years it took him to finish his degree. In the years following high-school graduation Carl continued his mathematical studies under the direction of Elling Holst, but at the University level. In one semester Holst employed Carl as an assistant. Holst was not surprised when Carl was the only one in his class to receive a "*praeceteris*", the highest possible score.

Carl Størmer took up university studies because of his personal interest in science and his parents wanted him to have the best possible education. A communication between Birkeland and Carl's father indicates that his parents first planned to send him to a university in France or Germany. Both Birkeland and Holst recommended that he should start university studies at home. Carl decided to major in mathematics, a choice that reflected his perception of the subject as interesting. However, he also gave long and serious consideration to selecting a career in botany. Of course, his parents paid all the costs during Carl's years at the University and provided whatever else he needed.

In those days the main purpose of the Royal Fredrik's University was to educate the cadre of civil servants that the country needed (Collett 1999). Unfortunately, this approach required hardly any research, as we understand it today. Professors were all official civil servants appointed by the Norwegian-Swedish government who enjoyed very high standings in the nation's cultural life.

The curriculum was very different from today's. It required a year and a half pursuing the *Andre Avdeling* or second degree, studying classical Latin and Greek literature and philosophy. High school graduation conferred the first degree. Carl finished on schedule but he acquired little taste for either Latin or Greek literature, although Latin probably was the basis for his command of French in later life. He did enjoy studying philosophy. After finishing the *Andre Avdeling*, Carl Størmer had to plan the rest of the studies by selecting two groups of subjects. Because he was so interested in mathematics and botany, he did not select either physics or chemistry.

In a 1946 issue of *Universitas*, the students' newspaper, Carl wrote an article about life as a student in 1890s. During those years there was a great lack of teaching halls and study rooms. For this reason all lectures in mathematics, mechanics and astronomy were given in a third floor apartment at Russeløkveien 6, a 5-min walk from the main campus. Cato M. Guldberg, the mathematics professor responsible for giving the main course, was such a kind-hearted man that he allowed the janitor's wife to dry diapers in the classroom. Størmer still remembered the stench! However, this illustrates the warm-heartedness of Guldberg. Normally between 5 and 10 students attended the lectures. Carl went to a few of Guldberg's classes on pure and applied mathematics. Otherwise he simply read class notes taken by other students who accurately transcribed all that had been said. When Carl attended the first lecture, but took no notes the Professor became upset. "Either you have to write down what I say or you have to leave the class." There were no homework exercises or problems to solve. However, Carl Størmer wrote, "Professor Guldberg was very humane in the final exam."

In another article he wrote: "In some lectures on botany, the room was so small that not everyone had a chair and a desk to write notes." Carl regarded lectures in mechanics by Professor Axel Thue as "very original and logically constructed, if you followed them very closely." Lectures in astronomy by Professor Geelmuyden "strictly followed his textbook". Geelmuyden was an old-fashion gentleman. He used goose-feather pens, oil lamps, and a Réaumur thermometer and generally did not care for modern inventions. He refused to use electric lights; "candlelight was good enough." The only lectures in mathematics that Carl enjoyed were those of Associate Professor Elling Holst. "His lectures were inspiring." Holst took good care of new students and arranged regular seminars several times every month in which students and candidates actively contributed to solving problems. Many of those who gave their first lectures in Holst's seminars, later became well-known researchers.

There were no designated places at the University where students could study different subjects or read journals. Neither did they have a cafeteria at the University where students could buy something to eat or drink. Even into his third year at

the University, Carl was still seriously considering botany as his main subject. However, the popular biologist Professor Axel Blytt died that summer, and Carl Størmer finally chose mathematics as his main subject.

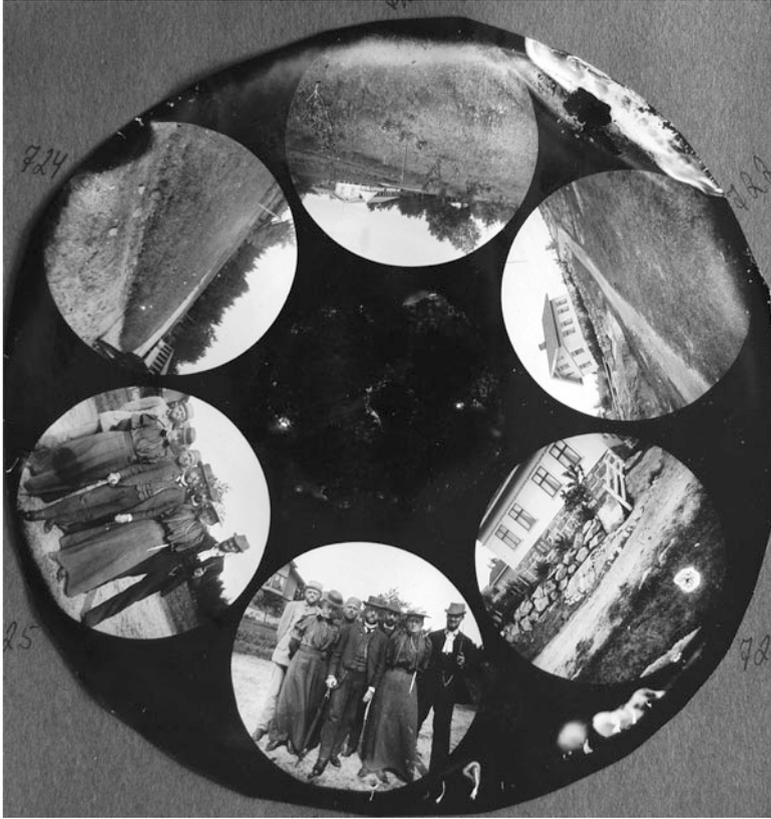
Carl's diary indicates that in the late fall of 1896 he took the first of four examinations required for graduation: (a) December 1; Mathematical Analysis, (b) December 4: Geometry, (c) December 7: Mechanics, and (d) December 9: Astronomy. All were written exams. In May 1897 he finished written and oral examinations in Geology. His average grade for all subjects was 1.6. In his diary Carl expressed disappointment about his failure to get grades of 1.5 or better on all examinations, as needed for "excellent" on his diploma. Working very hard to complete a paper on number theory for publication had cut into the time available to prepare for the examinations. In fact Carl published three short papers that year on geometrical series in the Danish journal *Zeuthens Tidsskrift for Matematikk*. Størmer's publication list shows that he published eight mathematics papers during his 6 years as a university student. Thus, he really did not have much time for ordinary studies.

On June 1, 4, 7, 8, and 9 1898 he took final written and oral examinations in botany, biology, geography and meteorology. On these tests he received very good marks with the results that his average for all examinations was 1.4. Both Carl and his parents were pleased. The candidate degree was considered to be roughly equivalent to a doctoral degree, but without a "doctor" title. Størmer never took a Ph.D.

As is clear from his university diploma and transcript Carl never studied physics or chemistry at the University. Both in his diary and other documents written after 1910, he expressed regret for not having studied physics. His diary also documents Carl as having enjoyed an active social life as a student. He was invited to many parties and participated in all kind of festivities, balls, banquets and music festivals arranged by the student union. He very much enjoyed dancing and invited girls from other wealthy families in Oslo.

### 2.3 Covert Photography

Størmer's interest in photography was not confined to auroral displays. Actually, he started taking pictures with his own cameras while still a young boy. Between 1890 and 1900 he ranked among the most active cameramen in Norway. He continued to take pictures after 1900, but not with his "Spion camera" (spy-camera). The National Library in Oslo is now home to 40 volumes of his photographs of people and scenes in turn-of-the-century Oslo. Between 1942 and 1943 Størmer wrote five articles about his photographic collections all in a journal called *St. Hallvard* that was published by the city of Oslo. Størmer's articles had the title "Instantaneous pictures of well known people on Oslo's main street Karl Johan, in 1890s." Most of the pictures were taken during the summer months while Carl walked up and down the main streets of Kristiania and streets close to Karl Johans Gaten.



**Fig. 2.5** Six photographs taken with Carl's spion camera. The two pictures with four people are from one of his botanical excursions with Professor Alex Blytt (cf. Chap. 5)

It was during the summers of his high-school and University years that Carl honed his skills as an amateur photographer. Størmer carried what he called a "Spion camera" underneath his topcoat and with its lens protruding through a buttonhole. A wire with a little balloon in the end extended from the camera down into the pocket of his trousers. Whenever he saw a suitable subject, he would lift his hat as courtesy and squeeze the balloon in the pocket to take the picture. He could only take six pictures on a film plate as illustrated in Fig. 2.5. When all six pictures were taken, he returned home to reload the camera. The subjects, who never realized that they were being photographed, included artists, politicians, beautiful girls and academic colleagues.

Other pictures include the prime minister, members of parliament, University professors and even of King Oscar II, all taken covertly as they strolled along Karl Johans Gaten. Carl also made photographic portraits of his family and of select scenes. As was customary a century ago, on their way to the university professors were dressed in top hats and formal attire. Carl's camera accompanied him on many



**Fig. 2.6** *Right:* photograph of Henrik Ibsen (1828–1906) taken by the spion camera in 1894; *Left:* picture, taken in secret, of a then well-known family in Kristiania on their way to attend a concert close to the University

field excursions, particularly with botany Professor Alex Blytt. The contents of 40 volumes and the witness of his colleagues attest to Carl's particular enjoyment in photographing young women. The collection includes pictures of Ada before he first invited her out to a well-known cafe in Kristiania. Subsequently, he bought more modern cameras that accompanied him on all his trips (Fig. 2.6).

Carl always regarded himself as simply an amateur photographer. Still, he participated in exhibitions in Norway and Stockholm that included portraits of famous Kristiania personalities, many taken in secret. While at the age of 70, many of his photographs were displayed at a special exhibition in Oslo. Since then a video was made that contains a large fraction of his photographic works. Over his long life Størmer was not just known for his own pictures, he often was asked to serve as judge evaluating the suitability for exhibitions of pictures by other photographers (Fig. 2.7).

Ibsen ranks as Norway's best known literary giant. Internationally, he is best known as one of the nineteenth-century dominant play-writes. He is often referred to as "the father of modern drama." In 1895 when the young university student Carl Størmer took secret pictures of Ibsen taking his daily walk to the Grand Hotel, he had just finished writing the play *Little Eyolf* (1894). It tells the story of the Allmer family with a mysterious character the Rat-Wife, a woman capable of enchanting rodents into following her. Superstition and mythology are closely connected with this Rat-Wife. At earlier times, long before technology provided means for quantitative observations, auroral phenomena were similarly connected with superstition and mythology (Sect. 3.9).

Surreptitiously taken photographs on Karl Johans Gaten were not Henrik Ibsen's first encounter with the Størmer family. Carl's great uncle and aunt lived in Skien. They were neighbours and close friends of Henrik Ibsen's parents. In 1840 Henrik's father went bankrupt, with significant impact on his son's career plans. Originally

**Fig. 2.7** Photograph of Professor Kr. Birkeland while in conversation with a colleague. He did not know that the young Størmer was taking his picture without first seeking permission. There are at least three pictures of Birkeland in the Størmer collection



Henrik wanted to study medicine, but his family could no longer afford the required university education. As a compromise Henrik agreed to work at a pharmacy with the goal of becoming a druggist. Pharmaceutical training was then gained via on-the-job training rather than at universities.

Størmer's great grandmother Helene Mülertz (1787–1856), was sole owner of the pharmacy in Skien after her husband's death in 1838. She knew the owner of a pharmacy in Grimstad, a coastal town about 200 km southwest of Skien. In 1844 she persuaded him to accept the 16 year old Henrik as a trainee. Young Ibsen spent 6 years in Grimstad before passing the first formal test toward becoming a pharmacist. About 3 years before taking the final exam he abandoned pharmacy to become a writer. It was during his Grimstad years that Ibsen wrote his first book *Catilina* and some exceptional poetry. The best known today of his early works is *Terje Vigen*, dealing with famine induced by a British blockade of Norway during the Napoleonic Wars.

## 2.4 Postgraduate Research in France and Germany

Shortly after finishing university studies in 1898, Carl was offered a scholarship to study mathematics abroad by the *Danish Hjelmstjerne Rosenkrone Foundation*. He planned to spend a year focusing on mathematics at the prestigious Sorbonne in Paris. Post-graduate opportunities of similar quality were unavailable in contemporary Norway. On August 26, 1898 he and his parents left Norway and travelled via Denmark, Germany to Paris, arriving on September 2. His parents stayed with him in Paris for more than a month. He spent the remainder of the academic year at the Madame Blondeau pension at 33 Rue Gay Lussac. Carl's letters from Paris were mainly written to his parents and Elling Holst. Most of them are still preserved. On June 22, 1899 he returned home. Later he expressed satisfaction with results of his stay in Paris (Fig. 2.8).



**Fig. 2.8** *Left:* the building at 33 Rue Gay Lussac, where Carl rented a flat. *Right:* a picture of the flat Carl rented in Paris while studying mathematics at Sorbonne, 1898–1899

His mathematics studies at the Sorbonne were conducted under the supervision of renown professors such as Charles Émile Picard (1856–1941), Henri Poincaré (1854–1912), Paul Painlevé, Camille Jordan (1838–1922), Jean Gaston Darboux, and Edouard Goursat. While he was in Paris, Norway's then best know mathematician, Professor Sophus Lie died. Carl wrote an obituary in his memory. After a few months in Paris, Størmer received a letter from the University in Kristiania indicating that starting April 14, 1899 he would be employed as *universitetsstipendiat*, in mathematics, equivalent to a research assistant. While his salary was not high, the appointment assured Carl that he had designated workspace at the University of Kristiania on his return (Fig. 2.9).

### 2.4.1 Jules Henri Poincaré (1854–1912)

Henri Poincaré, a giant of modern mathematics and physics, was born in Nancy, France, the son of a Professor of Medicine. He entered *L'Ecole Polytechnique* in 1873 and completed a doctorate in mathematics at the University of Paris. He was appointed Professor of Mathematics at the University of Paris in 1881 and Professor of Mathematical Physics and Probability at the Sorbonne in 1886. Thereafter, he held both positions until his death in 1912 at the age of 58. During his interactions with Størmer, Poincaré was working on his famous three-volume *Les Méthodes nouvelles de la mécanique céleste* (Fig. 2.10).

In addition to his many contributions to mathematics and physics, Poincaré was an astute student of the psychology of scientific learning. Like Størmer, during his whole life, Poincaré maintained a very strict schedule, dedicating 4 hours a day to research. He believed the subconscious mind continuously churned over problems. Therefore, he would never engage in research-related activities after 7 PM, lest they

**Fig. 2.9** The old mathematical university – École Normale, in Paris where Carl attended several lectures



**Fig. 2.10** Photograph of Henri Poincaré



interfere with his sleep and thus his creativity. In his *Mathematical Definitions in Mathematics* (1904) he wrote, “It is by logic we prove, it is by intuition we invent.” In Størmer he found both the intuitive imagination needed to grasp physical reality in new ways and the mathematical skills needed to prove or disprove the hypotheses of his intuition. Størmer was proud that Poincaré helped him to publish several papers in the French Academy Journal *Comptes Rendus*. On Birkeland’s and Størmer’s initiative, in 1902 Poincaré received a doctorate *causa honoris* from

**Fig. 2.11** Photograph of Marie-Ennemond Camille Jordan. On a few occasions Jordan invited Størmer to his home



the University of Kristiania. Both Størmer and Birkeland agreed that Poincaré was not a good lecturer.

#### **2.4.2 Marie-Ennemond Camille Jordan (1836–1922)**

Marie-Ennemond Camille Jordan was born in Lyons. He was professor of mathematics at the *École Polytechnique*, Paris from 1876 to 1912. His early work was in geometry. In his later work he mainly focused on substitution groups and the theory of equations first brought mathematicians full understanding of the eminent French mathematician Évaiste Galois. Jordan also edited the *Journal de Mathématiques Pure et Appliquées* from 1885 to 1922.

During the academic year 1898–1899 Størmer was in Paris pursuing mathematical studies at the Sorbonne University. Poincaré enjoyed international fame for his contributions to mathematics and theoretical physics. On several occasions Poincaré invited Carl Størmer to his home. Actually Poincaré had come to know of Carl a few years before he arrived in Paris. In 1893 Kr. Birkeland showed him one of Carl's early mathematical papers and discussed its contents. Because the paper was written in Norwegian, Birkeland had to translate it for Poincaré to read (Fig. 2.11).

On November 13, 1898 Carl wrote a nine-page letter to his mother about his initial encounters with Professor Marie-Ennemond Camille Jordan whom he admired and referred to as Camille. Jordan was Professor of Mathematics at *L'École Polytechnique*. Among other things, he was famous for having solved a problem initially posed by Niels Henrik Abel on the reducibility of algebraic equations by radicals. He was also an influential member of the French Academy and well regarded throughout Europe.

Carl's letter to his mother captures the spirit of collaboration that existed among European mathematicians near the end of the nineteenth century. The following paragraphs synopsise the letter's contents. Like any post graduate fellow, Størmer was anxious to get his career off on the right foot. It was important that he be introduced to *Société Mathématique* and Professor Jordan had promised to do it. On the agreed day, Jordan was away on travel. Størmer left a short note regarding his 1-year fellowship and desire to meet him. Two days later Jordan visited his apartment, but Carl was out attending a lecture. When they met on the following day Jordan excused himself profusely. They proceeded to the *Société Mathématique* where Jordan introduced Carl to the secretary and president. The event was less formal than anticipated. Several scientists were in attendance to present short contributions. They invited Carl to return on 23 November to present a paper that he had just completed. It was later published in their journal. Carl was voted in as a member of the *Société Mathématique* on that date. 25-francs per year covered dues for membership in the *Société Mathématique* and free copies of *Comptes Rendus*.

A more important event occurred 2 days later when Størmer was invited to dinner at Jordan's home. Størmer told his mother that he was in seventh heaven to receive such an invitation. In contemporary French academic circles such a dinner invitation required formal dress with silk hat and *redingote*, which Størmer hated. He was also required to come by way of a horse-drawn carriage.

The Jordan family included five children to whom Størmer was properly introduced. Jordan's home struck him as beautiful. With white hair and beard the professor looked much older than the vivacious Madame Jordan. Størmer brought with him 40 photographs of Norwegian scenery and short letters from Norwegian Mathematics Professors Sylow and Holst whom Jordan knew. Madame Jordan spoke of their honeymoon in Norway and love of the Norwegian countryside. Størmer was well aware of Jordan's visit to Norway, which explains why he came with so many pictures. The three of them spent a long time after dinner examining Størmer's pictures.

When a servant announced that the dinner was ready, Størmer was assigned to escort Madame Jordan to table. Størmer wrote that everything was wonderful. He used the word "*chic*", and then listed all they had to eat and drink. During dinner when Størmer mentioned having visited Poincaré, Madame Jordan was curious to know his impression. "Did he say anything?" Except when the conversation turned to mathematics, she always found him silent, looking up at the ceiling. She recalled spending an evening with Poincaré and the English mathematician James Joseph Sylvester (1814–1897), who carefully presented his latest work and conclusions. After a long, upward-looking pause, Poincaré loudly announced: "Your conclusion is wrong." Perhaps to soften the negative impact of her story, Jordan allowed that Sylvester had published too quickly and his work contained several mistakes.

Later, Jordan and Størmer held a lengthy discussion regarding when, how and where to publish contributions. Størmer mentioned that during the next meeting of the *Société Mathématique* he would present his most recent results. Professor Jordan said that he would be pleased to present these papers for publication in

*Comptes Rendus*. With Poincaré away on extended travel Størmer greatly appreciated the offer. Later in the conversation Størmer inquired why papers published in the French Academy's *Comptes Rendus* were limited to a maximum of three pages. Jordan provided the rule's historical context: A former President of the Academy had written so many long papers that it was only possible to publish his works. No space was left for other contributions.

It was a marvellous evening, but when the time passed ten, I thanked them very much and said goodbye.

Yours,

Carl

Give my special regards to E. Holst

On December 2, 1898 Carl wrote a second, 28-page letter to his mother among other things describing his first meeting at the famous *Société Mathématique*.

"I just finished a new paper which I feel should be published as soon as possible. When I went to *Société Mathématique* for the first time, I was well prepared and having written a short summary for oral presentation in French." Meetings always start with the president asking for "*une communication à faire*" or whether anyone has a work he wishes to present. One never announces a presentation before hand. I informed him at once that I had a contribution. When called, I went to the board and started my presentation. I was told beforehand that I should not write long and complicated mathematical equations, but try to use simple forms. The audience is not supposed to applaud or clap hands. During this meeting 15 mathematicians were present. They and I were in formal evening dress.

*I started my presentation with contempt for death. I felt it was better to jump in than to crawl. However, the printed version is more important. I tried to speak slowly and distinctly, as my French is far from fluent. However, I splashed a lot of chalk dust onto my evening dress, so by the time I finished it was almost white, but did not notice this before I sat down. I finished with an apology for my French, but the President responded that he experienced no difficulty understanding my talk. On the way back to my seat I passed the secretary and handed him my manuscript. During my presentation I brought a book with notes to help with the presentation, but forgot to take it back with me. The first thing the next speaker did was to hand it to me, with a kindly smile. I promised myself that this would never happen again, because it clearly showed that I was very nervous. Next time, I promise not to be nervous, spill chalk dust or forget my notes.*

*After the presentations, we had an informal gathering at which I was asked a few questions regarding my work. On the way back to my apartment, I walked most of the way with the secretary of Société Mathématique.*

During the autumn of 1902, Størmer studied mathematics at the University of Göttingen, Germany. He was impressed by the seminar held by Felix Klein (1849–1925). However, he was not happy with the courses given and missed his wife, close family and friends as well as social life in Kristiania. Soon after Christmas he returned to Norway. During his stay in Germany, he did master the spoken language to the degree that he felt fluent in both French and German. In later years he would also master English.

In August 1903, at the age of 29 Størmer was appointed Professor of Pure Mathematic at the University of Kristiania, a position he would hold for 43 years. Carl had to compete for the position with Alf Guldberg (1866–1936) a Norwegian mathematician. Guldberg was 8 years Størmer's senior and at the time, had published

**Fig. 2.12** Christian Krohg's painting of Carl Størmer when he was 40 years old. Christian Krohg (1852–1925) is one of Norway's most famous artists. The painting belongs to Georg Størmer



two more papers. The selection committee consisted of Professors Georg Zeuthen from Denmark, Felix Klein from Germany, and Edouard Picard from France. The committee chairman was Professor Ludwig Meidell Sylow from the University of Kristiania, who Carl knew well. The year before, Carl with Holst and Sylow had published a 374-page *Festschrift*, as part of a centennial celebration of Niels Henrik Abel's birth. The committee failed to agree on who was the better-qualified candidate, leaving it to the Faculty to render a final decision. They selected Størmer.

With historical hindsight, based on total publications and research accomplishments, they made the right selection. After being appointed professor, Størmer only referred to himself as Carl, dropping his three other given names. On September 8, 1903 the Faculty unanimously selected Carl Størmer as professor of pure mathematics, considered by many as the most exclusive of all sciences. On November 21, King Oscar II appointed Størmer Professor of Pure Mathematic at the University of Kristiania. His appointment was announced in a formal, four-page document. He succeeded Professor Anton Bjerknæs, the father of the well-known meteorologist Professor Vilhelm Bjerknæs. In accepting the position, Carl Størmer was required to sign another document promising to support the king's royal authority. His appointment joined with supportive comments by Birkeland and Poincaré, demonstrate that Størmer was considered to be a mathematician of great potential. Since his interests in botany and geology endured he continued to gather samples on trips around Norway and abroad (Fig. 2.12 and Chap. 5).

Carl's parents arranged a celebration of their son's appointment. His diary lists 29 guests who were invited to the dinner party. Ten gave speeches in Carl's honor. The diary specifically mentions that Professor Birkeland could not attend. Størmer presented the required accession lecture on April 14, 1904 but started giving his regular lectures in mathematics in January of that year.

Between September 1, 1917 and the summer of 1923 Carl Størmer served as dean of The Mathematics and Natural Sciences Faculty. From, 1921 to 1940 he also acted as deputy chairman of the *Academic Collegium*, the highest-ranking board at the University. During the German occupation of Norway in World War II (1939–1945) Carl continued serving as a faculty member, after passing the official

**Fig. 2.13** Elling Holst (1849–1915) was appointed Associate Professor of Mathematics (geometry) at The Royal Fredrik's University in 1890 and was widely recognized for his elegant lectures. At the time he was also working at Kristiania Technical School



retirement age. On January 1, 1946 Størmer became a Professor Emeritus, but continued to do research and visit the University daily until his death in 1957.

## 2.5 Associate Professor Elling Bolt Holst (1849–1915)

Elling Bolt Holst was Carl Størmer's tutor in mathematics long before he started at the university, and remained a life-long inspiration. During university studies in mathematics Carl considered him the best lecturer at the University. For several years Holst was a substitute lecturer before being appointed Associate Professor of Mathematics at University in 1890. Several documents clearly show that he was a popular teacher. Holst also wrote a popular book about science called *Norsk Billedbok for Barn (A Norwegian Picture Book for Children)*, which went through more than ten printings and can still be found in Norwegian book stores.

Carl regarded Elling Holst as a close friend. In his diary Carl noted that during 1893, Holst visited the Størmer residence once every week. Even for many years later, Holst and Carl met regularly. Holst was also an active artist and an author, who frequently gave lectures about modern literature. On July 17, 1909 Carl actively participated in arranging for Elling's 60th birthday celebration. On the occasion of Elling Holst's death in October 1915, Carl wrote a letter to his widow stating, "No other man has ever touched me as deeply as Elling when I was young, and I am thankful to have known him. He was such a special person." Størmer subsequently wrote a long obituary.

Holst was an important source of inspiration for Størmer from the age of 16 (Fig. 2.13). He was impressed by Størmer's intellectual capacity. Størmer was equally impressed and wrote about him in the Norwegian Biographical Dictionary



<http://www.springer.com/978-3-642-31456-8>

Carl Størmer

Auroral Pioneer

Egeland, A.; Burke, W.J.

2013, VIII, 195 p. 131 illus., 105 illus. in color.,

Hardcover

ISBN: 978-3-642-31456-8