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Marcel Grossmann

For the Love of Mathematics

CLAUDIA GRAF-GROSSMANN

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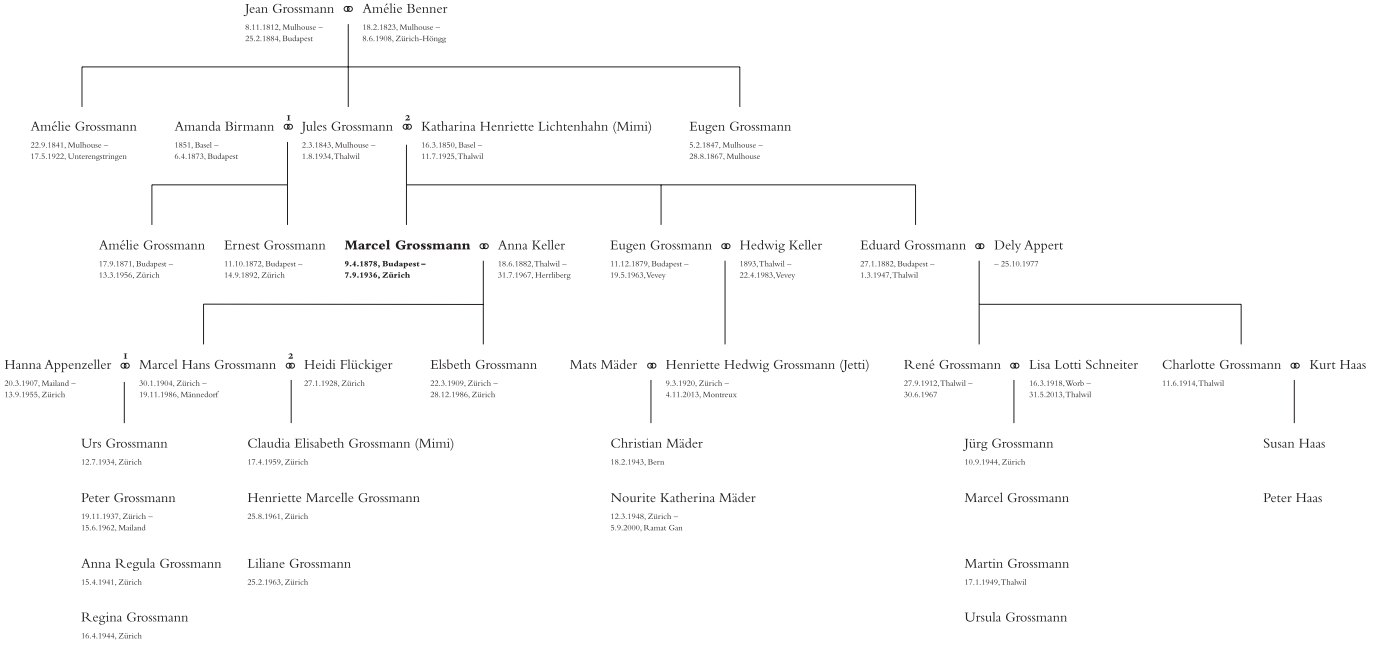

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For Christoph

Preface to the German Edition

A Bridge-Builder Between Physics and Mathematics

It gives me great pleasure to write a preface for this biography of Marcel Grossmann. The idea for this book arose during a visit of its author, Claudia Graf-Grossmann, and her sister to Pescara, the seat of ICRANet; and I am writing these lines shortly before the beginning of the fourteenth *Marcel Grossmann Meeting* which will take place in Rome during the 2015 International Year of Light, sponsored by UNESCO. This year also marks the 100th anniversary of Einstein's theory of General Relativity, as well as the Golden Jubilee of relativistic astrophysics.

What moved Abdus Salam and me to found the series of Marcel Grossmann Meetings in 1975? We were convinced that this European mathematician had built a bridge between mathematics and physics with far-reaching consequences, which right up to the present day can serve as a source of inspiration for modern scientists. In a book which is to appear shortly, "*Einstein, Fermi, Heisenberg and Relativistic Astrophysics: Personal Reflections*" [World Scientific, Singapore (in press, 2018)], I describe how the introduction of Special Relativity by Albert Einstein in 1905 placed our understanding of the fundamentals of physics on a completely new basis. His new approach, published under the title "*On the Electrodynamics of Moving Bodies*", is based on a series of elementary observations, and on simple derivations using Euclidean geometry and linear partial differential equations which can be analytically integrated in a rather simple manner.

Here, the concept of space-time as a basic element for the formulation of all the laws of physics was established, and the brief article is still impressive today for its clarity, simplicity, and scientific relevance. And yet it remains difficult to understand Einstein's theory of Special Relativity, simply because it implies a change of paradigm.

When Einstein published the theory of General Relativity ten years later, it set entirely new standards: in an extremely subtle manner, it makes use of non-Euclidean Riemannian geometry, and its nonlinear Lagrangian description of the fundamental interactions leads to a set of nonlinear partial differential equations in four dimensions, for which, a hundred years later, still no general solution has been found. In particular, General Relativity leads to the revolutionary new fundamental idea that the gravitational interaction can be described geometrically by applying the equivalence principle. When Einstein was developing his theory, he could make use of the flat, four-dimensional non-Euclidean space-time which his former teacher in Zurich, Hermann Minkowski, had formulated for Special Relativity. Einstein transformed this approach into a curved, Riemannian geometric model of space-time, which behaves locally like Minkowski's space-time. He also made use of David Hilbert's understanding of the nonlinear Lagrangian theory and applied the most elegant instrument of higher mathematics and geometry of his time—absolute differential calculus—which had emerged from the Italian school of Luigi Bianchi, Gregorio Ricci-Curbastro and Tullio Levi-Civita.

The bridge between the physical insights of Albert Einstein and the theories of the Italian mathematicians was made possible through a close collaboration with his friend Marcel Grossmann. Like Special Relativity, General Relativity is difficult to understand, due to its enormous conceptual, mathematical and physical complexity. In addition, the latter offers few possibilities for concrete verification, in contrast to Special Relativity, whose direct connection to the Maxwell theory of electromagnetism makes it easy to test. It required an incomparable courage to formulate such a challenging theory, which was far removed from the predominant opinions on physics at the time and which pursued a revolutionary new approach to the geometric definition of physical interactions.

In Italy, Einstein's work had deep roots at the Institute for Mathematics in Rome, in particular thanks to the insights of Federigo Enriques, Guido Castelnuovo and, most especially, of Tullio Levi-Civita. Marcel Grossmann pointed out to Einstein the scientific thinking of Gregorio Ricci-Curbastro and of Levi-Civita concerning the absolute differential calculus. Einstein and Grossmann worked together in 1913 on a definition of the gravita-

tional theory which would be based on this absolute differential calculus. Their joint publication (the "Outline" paper; cited in an appendix of this biography) includes two parts: the first, on the physical aspects of the theory, was written by Albert Einstein, and the second part, on its mathematical background, was written by Marcel Grossmann. Only recently have the various phases of the development of the Einstein–Grossmann equations come to light, when the unpublished notes of Michele Besso were submitted to a scientific historical analysis. These tedious and complex calculations aimed at explaining the anomalous precession of the perihelion of Mercury in terms of the new Einstein–Grossmann theory. The "Outline" published in 1913 did indeed not completely solve the problem, but the insights that it contained on the formulation of the equations and the classification of the astronomical data represented an important preparatory step for the later formulation and verification of the theory of General Relativity.

Before and after the publication of the theory, the contact between Einstein and Levi-Civita became increasingly close. Their cooperation led to mutual respect and to a friendship between the two men. I recall that Helen Dukas, Einstein's secretary of many years, showed me in Princeton the wonderful sentence that Einstein had written to Levi-Civita: "*I admire the elegance of your method of computation; it must be nice to ride through these fields upon the horse of true mathematics while the like of us have to make our way laboriously on foot*". There can be no doubt that the mathematical know-how of Tullio Levi-Civita, which was pointed out to Einstein by Marcel Grossmann, as well as Einstein's close association over many years to Michele Besso, with whom he could discuss all of his ideas, were fundamental for Albert Einstein on his path to attaining his goal of formulating the field equations of General Relativity—indeed, the most significant synthesis between physics and mathematics in the history of *homo sapiens*.

The Marcel Grossmann Meetings take place every three years in different cities: in Trieste, 1975 and 1979; Shanghai, 1982; Rome, 1985; Perth, 1988; Kyoto, 1991; Stanford, 1994; Jerusalem, 1997; Rome, 2000; Rio de Janeiro, 2003; Berlin, 2006; Paris, 2009; Stockholm, 2012; and, as already mentioned, again in Rome in 2015 and 2018. On the occasion of each Marcel Grossmann Meeting, awards are presented to individual scientists and to an institution (see also www.icra.it/mg/awards). The prizewinners are presented with a sculpture by the Italian artist Attilio Pierelli, whose original is made of silver and symbolizes the orbit of a particle around a black hole, after Kerr. For the first time in 2015, in addition to the MG Meeting itself, there were satellite meetings in Asia and South America.

We are happy to present this biography of Marcel Grossmann at a special ceremony in the *Palazzo Besso* in Rome. For, although Marcel Grossmann's scientific contribution to Albert Einstein's work is well known, there has been up to now little detailed information available on the man and the mathematician. This biography will fill that gap.

Rome, Italy

Prof. Remo Ruffini
Director of the International Center
for Relativistic Astrophysics Network (ICRANet);
Università di Roma 'La Sapienza'

The original version of the book frontmatter was revised: For detailed information please see Correction. The correction to the book is available at https://doi.org/10.1007/978-3-319-90077-3_16

Acknowledgements

Whoever delves as an author and a layperson into one of the most fascinating chapters of the history of science is skating on thin ice. Thanks to the support of the physicist and historian of science Prof. Tilman Sauer and of the mathematician Prof. (ret.) Dr. Urs Stammbach, I have avoided many perilous traps along the way. I accept the full responsibility for remaining notable *faux pas*! I wish to thank these two gentlemen heartily for their professional knowledge and their talent as detectives, for their attention to detail and for their patience. Tilman Sauer made incisive contributions towards the success of this biography and, with his scientific historical epilogue, he has lent it an essential gravity. Professor Dr. Remo J. Ruffini, theoretical physicist, founder and Director of the International Center for Relativistic Astrophysics, not only wrote the Preface to this book, but he has also made the name and the spirit of Marcel Grossmann known through the eponymous International Meetings, which he also founded.

Professor (ret.) Dr. József Illy went on a search for clues in the school archives of Budapest for this book. There, also, the art historian Edina Deme permitted me to obtain a fascinating insight into that city on the Danube around the turn of the last century. Barbara Wolff, from the Albert Einstein Archives at the Hebrew University of Jerusalem, was kind enough to critically read the manuscript, and she approved the publication of the 'Outline' of the theory of relativity in facsimile. Shaquona Crews of Princeton University Press gave permission to reproduce quotations, letters and photos of Albert Einstein. Daniel Schmutz of the *Bernischen Historischen Museum*, and the team of the ETH Library in Zurich, also gave me energetic support.

Furthermore, I wish to thank Dr. Hans Berger, the archivist of the Society of the *Constaffel*, Prof. (ret.) Dr. Martin Schwyzer, president of the *Naturforschenden Gesellschaft* in Zurich, and Dr. Hans Georg Schulthess for their valuable assistance. The *Confiserie Sprüngli* in Zurich researched their recipe archives, the *"Neue Zürcher Zeitung"* made possible many insights into the period described in the book, thanks to their digital archives, and the *Neue Helvetische Gesellschaft-Treffpunkt Schweiz* was so kind as to give me their book '*Kritischer Patriotismus*' by Catherine Guanzini and Peter Wegelin. The Municipal Archives of the cities of Basel, Schaffhausen and Zurich provided valuable background information. Anne Rüffer, the publisher at the *Römerhof Verlag*, as well as her associates Sandra Iseli, Saskia Noll und Selina Stuber, all helped the life of my grandfather achieve the form of an impressive book with their enthusiasm and professionality. I'm honoured that the English biography is being published by the prestigious Springer International Publishing AG and thank Dr. Angela Lahee for her commitment. Above all, I would like to thank Prof. William D. Brewer for his elegant and accurate translation.

Last but not least, I thank my family in England, Spain, Israel and Switzerland, who searched in old boxes and photo albums, gathered many interesting facts from the family history, and helped me by reading through the text. In particular, I am very grateful to my mother, Heidi Grossmann, for her notes on the illness of my grandfather and for her transcription of the diaries of my father, as well as for the travel notes on the walking tour of the two brothers Eugen and Marcel Grossmann. And I thank my husband, Christoph, for his loyal and tireless support from the beginning to the end of the two-year process of research and writing.

Contents

Prologue

In Zurich, a long, hot summer is coming to an end. Since June, the city on the Limmat has been suffering under the unusually high temperatures. The banks of Lake Zurich are besieged by young men with sun-tanned torsos, by girls in fashionable shorts, who lounge languorously on their beach towels and occasionally cool off in the waters of the lake. For older people and for people in poor health, in contrast, the weather has been a torment.

In the high-ceilinged rooms of the Paracelsus Clinic at *Seefeldquai* No. 49, near the Riesbach Harbour, the mercury has climbed to over 20 °C. even in the early morning, and the nuns have all they can do to cool hot foreheads and change bedsheets. They march tirelessly up and down the stairs in the romantic, impractical Italian-style building; their freshly starched habits soon look spotty and wrinkled, and the white bands of their caps are askew above the perspiration on their foreheads. But the women of the Menzinger Order are true to their reputation as hospital nurses: they radiate calmness and good humour and even manage to conjure up a smile now and then.

By 7 September 1936, the temperature has finally dropped to normal, and it is raining intermittently. In the evening, a light drizzle continues to fall onto the dried-up lawns and the prematurely coloured leaves of the trees in the garden. Does the patient, who is lying feverish in his bed and breathing heavily, hear the soft hissing of the raindrops and the rustling of the leaves? Or are the sounds of long-past times going through his head? The laughter of children, the scrunch of a sled gliding through a winter landscape, the jingle of the bells on the harness of a snorting pony?

Marcel Grossman has long since been living in the world of his memories and his thoughts; he can no longer stand up or speak clearly and is completely dependent on the help of others. Anna, his wife, understands him even without words. She sits beside him for long hours, sometimes working on her sewing; often, she falls asleep in her chair. The past months and years have taken their toll, and the continuing worries over the health of her husband, with the bedsores of the patient who is confined to his bed, have worn her down. Anna's arm causes her pain almost all of the time. But at least she can breathe freely now; others are taking care of Marcel and trying to relieve his bodily afflictions. At regular intervals, she turns over the almost motionless, heavy man. His bedding is changed; he is powdered and rubbed with salve. They give him sips of tea and try to lower his fever with cool wrappings. That is about all they can do to relieve the advanced pneumonia which has befallen his body, weakened by multiple sclerosis. Alexander Fleming has indeed already recognized the antibacterial action of penicillin, but it will be years before the first antibiotics, with their beneficial effects, are available to patients.

The atmosphere of quiet care that dominates the room spreads a feeling of calmness and peace. Slowly, the breast of the patient rises and sinks; at times, he gives a rattling cough. His breathing is pressed, distressed, and comes at longer and longer intervals.

1

A Spirit of New Beginnings

"*Marcel was born on the 9th of April, 1878, an endearing and sturdy child, who was a great joy to us* [1]." That is how Marcel Grossmann's father later remembered the birth of his son. A great joy—that is something that the young merchant values highly, given that years of an emotional roller-coaster ride lie behind him.

And yet, everything had begun so hopefully. Jules Grossmann is one of the enterprising young tradesmen and merchants who are active in the aspiring Danube monarchy of Hungary. He was born on March 2nd, 1843 in Mulhouse [Alsace], as the son of a Swiss family living in France—and, according to French law at the time, he is a French citizen. His father Jean had also been born in Alsace, whilst *his* father, Jules' grandfather, had left his home community of Höngg, near Zurich, as a fourteen-year-old. There, the Grossmann family was first mentioned in the rent-roll of the Einsiedeln Cloister from the year 1331, as farmers with their own land. Probably for economic reasons, Jules' grandfather emigrated as a teenager to the small Republic of Mulhouse, which was undergoing rapid industrial development and had been closely allied with Switzerland for centuries, to begin a new life there. Jules' parents, Jean and Amélie, operate a commercial firm there. The inventory is variable, mainly barrels and kegs (Amélie's family were bucket and tub makers), but also wooden and basketry articles, sometimes toys—to the great pleasure of Jules and his siblings, Amélie and Eugen. The children grow up bilingual; their mother tongue, French, remains ever-present for them.

C. Graf-Grossmann, *Marcel Grossmann*, Springer Biographies,
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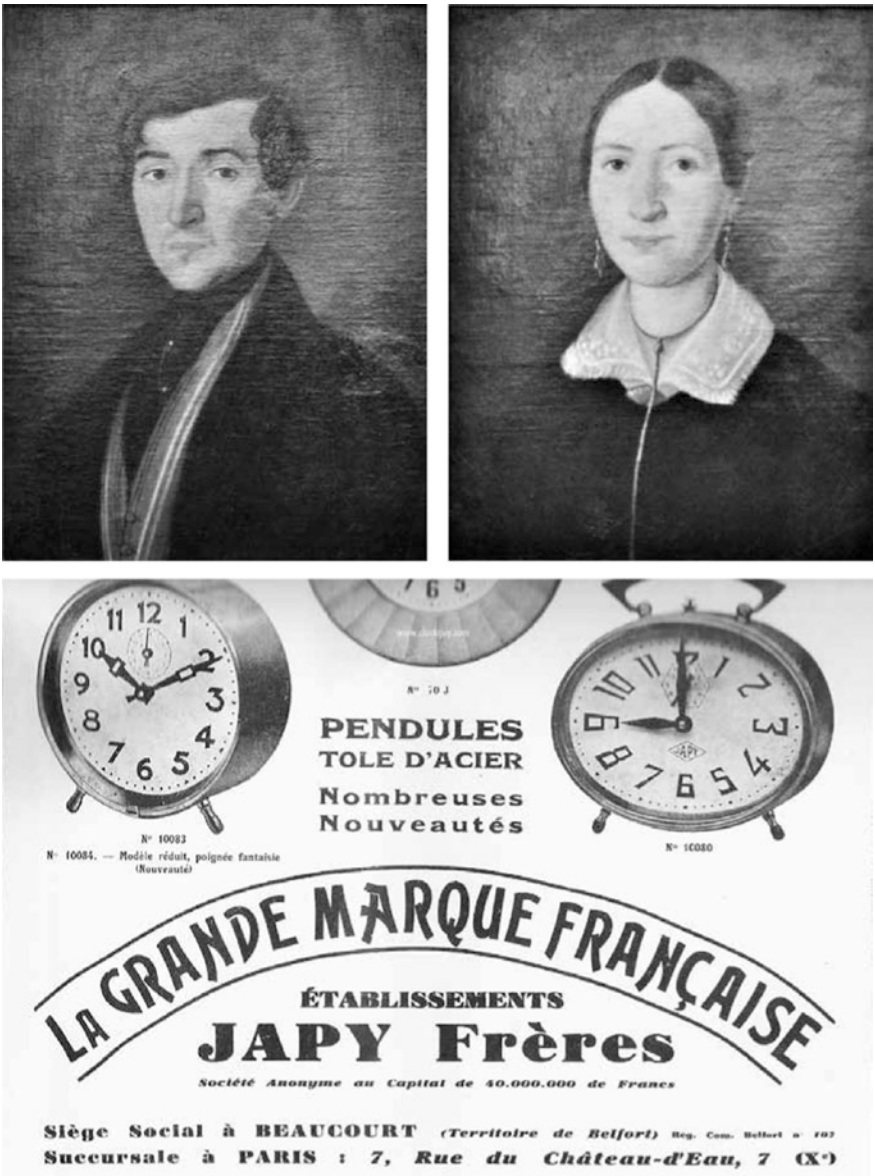

Illustrations Jean Grossmann and Amélie Grossmann-Benner (oil painting, about 1840); and an advertisement for *Japy Frères*

After completing school and an apprenticeship as a merchant in Mulhouse, Jules is allowed to go to work for his uncle Albert Millot in Zurich as a

trainee clerk (*commis*, as young office workers were called at the time). Millot is married to Jules' Aunt Adèle, had moved with her in 1852 from Mulhouse to Zurich, and from modest beginnings, he has earned respect and esteem in the miller's trade. He owns a factory for mill construction, in particular for roller mills, and deals in supplies for the needs of millers. Cast-iron objects, for example the elegant garden furnishings which charmed the bourgeoisie in the mid-19th century, round out his range of products. The duties of the young clerk are quite varied and carry a certain responsibility: He serves as cashier, receives deliveries of goods, sees to their storage and prepares the transport company papers, he writes invoices and purchases small apparatus and accessories. His work in Zurich is effective, and he could certainly have remained at his uncle's firm for a longer time. But he is a bright young man, sometimes a bit obstreperous and independent, and he brashly comes to the conclusion that his uncle's personnel policies are not to his liking. His decision is quickly taken: He will become his own Lord and Master. In 1867, he begins his new life of self-employment by visiting the World's Fair in Paris. He applies himself to dealing in supplies for the miller's trade, an occupation which he had learned in depth at his Uncle Millot's. On the way back, he visits the representative of a manufacturer of millstones in the French town of La Ferté-Chouard, and thus lays the ground for his future selection of commercial products.

The first domicile of the young company is a four-room apartment in the *Gerechtigkeitsgasse* No. 4 in Zurich. Jules Grossmann works and lives here. He takes a small bedroom for his own use; the remaining rooms serve as office and as storage space. The young start-up entrepreneur is confident; the spirit of the age fires his imagination. In his memoirs, he notes: "*Like the airy glimmer of the evening sun, I saw the passing of the olden times, whose history was long, great and even glorious, but at the same time I saw the beaming morning sun of the new epoch: Free trade and an impulsively expanding industrialism*."

This pioneering mood was also predominant in Hungary which, following the revolution against the Hapsburgs in 1848/49, the Austrian defeat at Königgräz in 1866, and the Austro-Hungarian Compromise of 1867, had eked out a clear measure of independence from Austria. The administration of the country, which previously had been centrally located in Vienna, had been withdrawn. For merchants, this country is a veritable Eldorado, and in Switzerland the word is out that a promising new market is opening up in Hungary. That agricultural land was particularly interesting as a market for millers' equipment, and Jules had become aware of the multi-ethnic country whilst working for his Uncle Albert Millot. Now that he is independent,

he travels several times to Hungary and establishes his first contacts to the mill owners there. Many of the Hungarian mills have Swiss directors or even owners; the managers, chief millers, chief machinists and office employees are also often Swiss.

The young man is impressed by the grandeur of *Pest-Buda*, as it was still called in those days, by the "*enormous, almost oriental hubbub*" in the splendid old State Railway station, and the "*melée of baggage carriers, omnibuses and other vehicles*". The picturesque location and the beauty of the city on the Danube with its castle, its majestic bridges, the wooded mountains in the West and its liveliness, "*not comparable to any Western European city*", capture his interest. As a sober businessman, he also senses that a market is opening up here, in which merchants can be successful even without knowing the Hungarian language. Although Magyar had been made the official state language in 1825, German is still spoken by a majority all over the country. Especially Swiss, who don't carry the 'stable aroma' of the Austrians, are welcome here. In 1870, according to the statistics of the Swiss consulate, 30 Swiss are working in the foodstuffs industry, of those 20 in the miller's trade. Of these, 12 are between 21 and 35 years young [2]. Between 1871 and 1891, the number of Swiss in Hungary will double from 516 to 1032, making them, after the Germans and the Italians, the third largest foreign group there [3].

Grossmann makes a great effort, contacting first the large and then the smaller mills. His success is indeed initially "*equal to zero*", but the young merchant perseveres and finally wins his first customers: He receives an unusually large order for millers' supplies, mainly silk gauze and millstones. The silk gauze is used for sieving the ground flour; gauze of varying mesh size is stretched onto wooden frames for that purpose. Stacked one above the other, they permit the separation of coarse meal, bran, fine flour and dust. The fragile gauze is cleaned regularly and has to be replaced at intervals. This is a line of business which promises repeated orders over a long period of time.

After Jules—aided by his sister Amélie—has initially operated his business from his apartment in the *Gerechtigkeitsgasse* in Zurich for a while, in 1869 he ventures the next great step and moves to *Pest-Buda*. The decision is not easy for him; he has become fond of Zurich (and of a certain young lady, whom he admires from afar when she attends the French church in the *Kirchgasse*). On the other hand, he is supported by his silk-gauze supplier, who wants to expand into the Hungarian market and promises orders. Wishing to be clear about his goals, Jules climbs up onto the 'home mountain' of Zurich, the *Üetliberg*, looks down on the city on the Limmat, considers the pros and cons—and comes to a clear decision, which sounds a bit

precocious for such a young businessman, but is meant quite seriously: *les affaires avant tout* ["business before everything else"]. This motto will accompany him throughout his whole life. The die is cast; his move to the Danube is in preparation.

In 1869, Grossmann moves into his first business domicile in *Pest-Buda*, near the parish church on the banks of the Danube. His cousin Albert Hollender from Munich, with whom he has already undertaken a trip to Hungary and with whom he can work together quite well, likewise moves to the city, and will spend years at Jules' side working in the commercial firm. Grossmann later describes his impressions of Hungary at that time as follows: "*Up until 1867, Hungary was in fact a province of Austria, even though it was called the Kingdom of Hungary. Its territory included Slovakia in the North, Transylvania and Wallachia [Romania] in the East, in the South the Serbian Province and Slovenia, at its centre the large Magyar Province, and to the West, German-Hungarian regions. Great forests lie to the North, East and South. Enormous low-lying plains with the most fruitful lands, great deposits of coal and iron ore, rich vineyards and tremendous cattle-breeding areas. When travelling, one sees large herds of oxen, horned cattle, sheep and horses without end. The land is cut through by two great rivers, the Danube and the Tisza. The country's administration is extremely precarious. The Austrian administration has departed, and the Hungarian, often with an antiquated organisation, is not up to the task. […] Industry is still spread very thinly. But the year 1867 brought a great opportunity for agriculture: There was a poor harvest in Western and Central Europe, whilst a record yield was obtained in Hungary. The sudden demand for cereals brought extraordinary profits for the country; steam mills, alcohol refineries, machine factories, banks and savings and loans sprang up so to speak out of nowhere*."

The evolution of the population in the 19th century mirrors this stormy growth: The number of inhabitants of *Pest-Buda* increased from the end of the 18th century until the first years of the 20th from around 50,000 people to 900,000! [4].

In this flourishing land, young professionals and merchants feel quite at home. Jules Grossmann leads an active, gregarious life in *Pest-Buda*, working hard, but also spending happy hours within a circle of Swiss exiles of his own age. Engineers, architects, construction experts, merchants and machine technicians meet, and form a "*fresh, happy society*", which is soon organised into the "Swiss Support Association" (SUV). Grossmann, who owing to his birthplace in Mulhouse also has French citizenship, now renounces it in favour of Swiss citizenship, even though his heart will belong all his life to the *grande nation*.

The young Swiss have at their disposal a small, separate club room in the hotel "*Erzherzog Stefan*", where 'patriotic' newspapers are on offer and where they can play at games of cards. Grossmann is active for several years in the social section of the SUV, serves as cashier and makes many acquaintances. In 1870, at the largest steam mill of the time, the *Ersten Ofen-Pester-Dampfmühle*, which belongs to the successful Swiss industrialist *Haggenmacher* family, from Winterthur [5], he meets a "*pretty, slim young lady, whose aspect struck me quite strongly*". She is Amanda Birmann, the sister of the Swiss bookkeeper at the mill; Jules describes the meeting 50 years later as a *coup de foudre* [thunderclap]. What is this young woman, who grew up in Aarau in modest circumstances, doing in the city on the Danube? Did her parents send her to *Pest-Buda* in the hope that she would find a husband befitting her rank there? The idea seems not unlikely; there is a considerable excess of unmarried men among the Swiss exiles in Hungary. Whatever the goal of her trip may have been—Amanda Birmann is hard pressed, she is intimidated by the lively and noisy metropolis. She stays close to her brother, accompanies him to work and to events of the SUV. This is not hidden from Jules; he attends the social events more often than usual. During an excursion to the Johannesberg mountain (*Jánoshegy*), to the popular restaurant "*Zur schönen Schäferin*", he finally manages to strike up a conversation with her.

The young merchant is head over heels in love, but he at first hesitates—is he in a position to support a wife, a family? As he had already done in Zurich, Grossmann goes up onto a mountain in order to organise his thoughts: He climbs the many steps up to the terrace of the royal castle in *Ofen*, and once again, in view of the "*splendid city of Pest*", he considers what direction his path should take. In Zurich, his work gained the upper hand; this time it is *la voix du coeur* [the voice of the heart] that wins out. After his decision, he hesitates no more; evidently, neither do Amanda and her family, and within the same year, the wedding takes place. The bride is 19 years old, her groom eight years older. They must have made a handsome pair when they went strolling together in *Pest-Buda*, the dark Jules Grossmann with his dapper parted hair and his confident regard, giving friendly greetings to people on all sides; and his tall, slender, light-brown-haired wife with her alabaster complexion at his side.

These two people, with their such different dispositions, complemented each other well: Jules is confident, pragmatic and decisive, whilst Amanda is more introverted. She all the more enjoys furnishing in a homely manner the new dwelling of the young married couple, on the 2nd floor of a large apartment building in the Markos Street (*Markò utca*). She shows her good taste and aesthetic sense in the process.

In 1871, the first child arrives, Amélie. Father Jules is building up his firm, which has its headquarters just around the corner, on the ground floor at Markos St. and the Waitznerring (*Váci körút*, today called *Bajcsy-Zsilinszky út*). The location is quite advantageous for a commercial establishment: The elegant building, recently completed, is just 200 m from the Austrian State Railway station, on the broad boulevard which leads to the Basilica of St. Stephen. The mill quarter, somewhat further north on the banks of the Danube alongside the *Margareten* Island (*Margit Sziget*), is easily reachable, and deliveries can be quickly brought there.

Horse-drawn taxis pass by the house continually, and the first trolley car line is soon opened. Later, son Eugen describes the scene as follows: "*On this main street, there was a lively traffic of the horse-drawn trolley cars, some of which were double-deckers. Their horns could be heard all day long and late into the night. The many carriages and horse-drawn cabs which passed by in full gallop also caused a thunderous noise of hoof claps. And then sometimes the soldiers from the nearby barracks would march past, which was not always enjoyable for the olfactory sense, but, when the military band was playing, it was a treat to the ears. A highlight which we experienced several times was the passage of the Emperor Franz Josef in his yellow-black court carriage, arriving from the nearby West Station, saluting to either side to the tune of the enthusiastic* Eljen *("long live the emperor") called out by the crowd of spectators* [6]."

In the meantime, Jules Grossmann can also afford his own carriage, a modest one-horse buggy. He receives customers, intensifies his contacts tirelessly, and keeps his eyes open on the metropolis. Its aspect is changing rapidly: Whoever can afford it is building an elegant villa, a city residence, or an opulent company office. *Pest-Buda* is justifiably proud of its location on the Danube and wants to keep pace with the most beautiful cities of Europe. It is often called the "Paris of the East", and the developments on the Seine under Baron Haussmann are attentively followed and eagerly imitated. Buildings and palaces line the new generously-dimensioned and tree-bordered avenues and squares. Architects and contractors give their creativity free rein, planning and building in the neoclassical as well as an eclectic *Art Nouveau* style. This latter was especially favoured in Hungary; its people indulge in buildings from the French and Italian schools, and enrich those styles exuberantly with motives inspired by the Ottoman Empire.

Jules Grossmann notes with interest how luxuriously the facades are decorated, and remembers that during his apprenticeship at his uncle's, he had heard of a renowned French cast-iron foundry, *Val d'Osne*, near Paris. In June of 1871, he undertakes a trip to Paris so that he can form an opinion about the firm. He had postponed the trip several times due to the Franco-

Prussian war, with the siege of Paris and the uprising of the Paris Commune, but now, in early summer, a precarious calm had once again descended on the Seine. Bismarck has marched off following his victory, and the revolutionaries are in jail. Jules Grossmann experienced that at first hand: He visits the Palace of Versailles, where a few months before, the French-German peace treaty was signed, in which France ceded Alsace-Lorraine to the German Empire. In the *Orangerie*, Grossmann sees and hears the thousands of imprisoned *communards*, who are waiting there for their sentencing! These communards had incited a revolution against the conservative central government between March and May of 1871, and had unsuccessfully tried to force the adoption of an administration along socialistic lines.

It must have been painful for the Mulhouse native to stand at the place where the loss of his homeland had been signed and sealed. From a business point of view, the trip to Paris was however worth the effort: The *Val d'Osne* company as yet has no representative on the Danube, and Jules soon has his first successes in selling cast-iron parts for artistically decorated balconies, railings, garden fences and candelabras. Naturally, the owners of these splendid villas want to decorate their interiors in a corresponding manner, so the young merchant adds a product line from the Parisian firm of *Japy Frères* to his flourishing business; they are known for their high-quality iron goods, household articles and in particular for their splendid ornamental long-case and mantelpiece clocks.

Who in *Pest-Buda* can afford to commission the most famous architects and decorators for the design and construction of villas and company headquarters? Alongside Hungarians, Germans and Swiss, it is in particular the Jewish inhabitants of the city who contribute materially to the boom. On his arrival in the city, Jules Grossmann had been surprised at the number of representatives of the Jewish faith who are living there, primarily immigrants from Galicia. That region, which was divided up at the Yalta Conference in 1945 and now belongs to West Ukraine and to southern Poland, was formerly a part of the Austro-Hungarian empire, beginning in 1804. Large numbers of people moved out of the extremely poor agricultural regions and went to the cities in the West in search of work. And they found it there in quantity. In certain professions, the Jewish are predominant. Jules Grossmann attributes this to a "*remarkable lack of interest on the part of the Hungarian minor aristocracy*" in commerce and the liberal professions. The Jewish immigrants filled this gap, becoming successful lawyers and medical doctors, real estate agents, managers of health and vacation spas, detectives and police.

The Jewish community in *Pest-Buda* in Grossmann's time makes up nearly 25% of the city's population [7]. They are not only active and entrepreneurial, but also decidedly modern and open to new technologies, and often among the first to adopt them, as the telephone book from 1880 demonstrates. The economic growth which took place in those years had to be financed, or at least financially secured. This is frequently arranged by Jewish financiers. It is thus not out of place to say that the quantitative and qualitative period of development on the Danube could not have taken place without the Jewish community. This did not protect them from suffering the same fate as their fellow Jews in Germany beginning in the 1920's: Following the occupation of Hungary by the National Socialists in 1944, an "*uninhibited fury of deportations*" began, in the course of which within only a few weeks more than 400,000 Jews were sent off to Auschwitz [8].

In the 1870's, all of that still lay in the distant future; the mood in *Pest-Buda* was euphoric, and the trees seemed to be growing right up to the sky. Jules' and Amanda's family is also growing: In 1872, their second child, Ernest, is born. As was usual at the time, the Grossmanns hire a wet nurse to care for him, and she lives with them for a whole year. The baby thrives, but Amanda has been weakened by the second birth. And her psychological state has also not improved in the company of her sturdy husband; she remains timid and uncertain. When the head of the family undertakes an urgent business trip to Paris before Christmas of 1872, Amanda is frightfully depressed. By his own admission, the young father has lifelong regrets about this—in his own eyes unimportant—brief absence.

A year of extremes follows, and it plunges the young family into a deep crisis, which begins with the preparations for a great event: Vienna is making plans to host a World's Fair. It is the first time that such an event, which was organised twice each in London and in Paris beginning in 1851, is to take place in a German-speaking country. The Exposition opens with pomp and circumstance on May 1st, 1873. It is planned to be more grand than any previous event; the metropolis on the Danube is virtually turned inside out. The old fortifications are torn down and hauled away, and the *Ringstrasse* takes their place; the streets and the railway system are modernised, the Danube is channelled, and the Prater is beautified [9].

Jules Grossmann is kept busy simultaneously in the stands of his Parisian suppliers *Val d'Osne* and *Japy Frères* in the French section of the Exposition. The French want to prove to the world just how tasteful and artistic their products are. One imagines being in the cave of Ali Baba: Oversized canopy beds, period furniture, faience vases—and cast-iron ornaments, as far as

the eye can see. Whole exotic villages are constructed; business is overflowing. Jules Grossmann takes care of customers and advises them, organises the sales operations of the stands, and arranges living quarters for company representatives in the overfilled city of Vienna, where 50,000 contributors and visitors to the Exposition are staying.

What a change in scene when he returns to Hungary: Amanda is sickly, nervous and short-tempered. An excursion to an afternoon concert at the *Redouten Saal*, which was intended to cheer her up, has to be interrupted because the young woman feels unwell. Her condition soon worsens; the doctors called to her bedside suspect typhoid fever. Her fever increases, her illness becomes more and more serious, and in April 1873, Amanda Grossmann-Birmann passes away at age 22. Her widower is, as he says, "*the most unhappy person on Earth*". Not only is he suddenly confronted with the necessity of taking care of the household and of two small children (rather unsuccessfully, as he himself admits), but also the loss of his first great love nearly bowls him over. His sister Amélie, who had already helped him during his time in Zurich, immediately travels to *Pest-Buda* to offer her support. She is indeed described as a splendid cook, but has essentially no experience with taking care of small children. Amélie Grossmann is spontaneous and decisive, but she has no special organisational talent. If this becomes obvious even to her brother, who knows little about matters of housekeeping, the chaos must have been hard to overlook. To add to the misery, a cholera epidemic breaks out in the city, owing to the poor sanitary conditions at the time and the rudimentary hygiene, without a sewage system. Jules travels back and forth between the Exposition in Vienna, with all its splendour and colourful business activity, and the silent and sad apartment at home in Hungary.

The joyless years pass slowly by. Jules Grossmann plunges into his work, which will be his support and refuge in the coming years. The children are taken care of by Amélie and a nurse, and slowly, a thin sheen of normality returns. But now the young father begins to feel unwell himself; he is overworked, often has headaches and is constantly tired. A period of rest and recuperation in Switzerland, in Brestenberg on the Hallwilersee in Aargau, restores him to health. There, the patients of the spa in the quaint castle under towering plane trees are not spared in their treatment: They are wrapped in steaming cloths and left to lie until perspiration flows from all their pores. Then they are doused with cold water, dried off and put under the rainwater shower. As part of the recuperation process, they have to drink lots of water and observe a strict diet. But evidently, many of them feel "*cheerful and joyous*" after this treatment, as claimed in an historical document [10].

Perhaps the voluntary and shared suffering often contributes here to the forming of tender relationships, as at all health spas. For Jules Grossmann, that is at first difficult, since he is still mourning his Amanda; but reason triumphs: He concludes that at 33, he is too young to be a permanent widower. He meets the 26-year old pastor's daughter Katharina Henriette Lichtenhahn from Basel, and in December 1876, at the Rhine Bend, they announce their engagement.

Henriette, called 'Mimi' at home, is descended from a family which traces its roots back to the 12th century, when they lived in and around Jena, in Thuringia, as Knights of Lichtenhayn [11]. Their descendants were mostly merchants; in 1524, the iron merchant Ludwig Liechtenhain became a citizen of Basel. Over the centuries, this family produced craftsmen, merchants, later also pastors, doctors, military men and artists. Henriette is not as beautiful as Amanda; she has a serious face and wears her hair parted and pulled back severely in a knot. But she has clear, shining eyes which look upon the world calmly and with confidence. Everyone who knew her describes her as a charming woman, warm-hearted, loving and blessed with humour. Jules and Henriette Grossman will spend nearly fifty years together. And what began as a practical marriage develops over time into a happy, harmonious and stable relationship; deep friendship and love unite these two persons, even though there is no more talk of a *coup de foudre*.

Following their wedding in 1877, Mimi moves to Budapest. Son Ernest recalls in his memoirs how their father prepares him, five years old at the time, and his six-year-old sister Amélie: "*It was evening, we were sitting on his knees and heard that he was planning a trip to Switzerland. In the way of children, we were quick with wishes, and were very surprised when we heard that he was going to bring us a new mother* [12]." Henriette takes on responsibility for the two little half-orphans quite naturally and with great energy, and rather soon there is once again a "*cosy, comfortable family life*". To be sure, she soon finds that the two children are not easy to deal with, as Ernest later self-critically admits. Their aunt had somewhat overdone the loving care and protection when she jumped in to help: Ernest and Amélie have never had contact to other children their own age and spend almost all their time in the apartment; they practically have to be dragged out to go on a walk. There is a confusion of languages in their little heads: They know some French, which they learned from a governess, speak Swiss German and know some Hungarian words. Here, the influence of their stepmother begins to have a beneficial effect. She has them take lessons in Hungarian from a private teacher, brings the two of them together with other children as often as possible, and makes sure that the two pale indoor children and