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THE ROLE OF LAJOS MARTIN IN HUNGARIAN ACADEMIC EDUCATION IN CLUJ

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Abstract

Lajos Martin (1827–1897) was a mathematician, engineer, corresponding member of the Hungarian Academy of Sciences (1861), founding member of the Transylvanian Museum Society, first appointed professor at the Hungarian University of Cluj founded in 1872, one of the Hungarian pioneers of aviation, and also warden of the Evangelical church. In 2022 was commemorated the 125th anniversary of his death and also the 150th anniversary of the founding of the University of Cluj, of which he was professor, from the foundation until his death. He was also the rector of the institution in academic year 1895/96. His legacy (the floating wheel, his collection of papers containing his research and the Martin folder) was bequeathed by his children to the Transylvanian Museum Society, the institution where he gave many lectures and published the results of his research. The present study aims to present in more detail not only the part of his life revealed by his commemorative research, but also that part of his life which highlights his role in Hungarian education in Cluj, as educator and institution leader, marked by his faith in science.

Keywords*: education, research, history of science, Lajos Martin.*

1. Introduction

Martin Lajos Martin, mathematician, engineer, corresponding member of the Hungarian Academy of Sciences (1861), founding member of the EME, first appointed professor of the Hungarian University of Cluj, one of the Hungarian pioneers of aviation, and the caretaker of the Lutheran parish – in 2022, was commemorated on the occasion of the 125th anniversary of his death and the 150th anniversary of the founding of the University of Cluj, of which he was a professor from its foundation until his death, and rector in the academic year 1895/96. His legacy (the floating wheel, his collection of papers containing his research, the Martin folder) was bequeathed by his children to the Transylvanian Museum Association, the institution where he gave many lectures and published the results of his research. Research into the life, work and legacy of Lajos Martin has been ongoing for several years, and we intend to publish the partial results, interesting facts and testimonies of this research from time to time.

2. Collection of the legacy of scientists

Researching the career of a scientist-teacher is always an exciting task, especially when the collection of sources and data provides additional information that forces one to reinterpret and thoroughly examine many known and published data. Lajos Martin can be characterised as many things: a man with a thirst for knowledge; attention to technical creation; a conscious pursuit of innovative realisations, from dreams and ideas to discoveries and then to proof; a drive to patent and protect results, presenting them in lectures; continuous publication in several languages; education, nurturing the offspring of knowledge.... The only way to find out who he really was is to collect his legacy, to study his works, his publications and the literature about him. Collecting legacies is one of the EME's major tasks: to discover, collect, digitise, preserve, care for and make accessible the legacies of scholars who would otherwise be lost. In the case of Lajos Martin, this was an even more interesting task, since in 1913 his

Figure 1. *Portrait of Lajos Martin (foto: Elinger Ede, Budapest, 1881. Source: MTA–KIK, Ms. 10.206/91)*

children gave to the EME their father's invention, the hoverwheel, with several documents, drawings and papers, so that it would be preserved and stay at home. Over the years, they have suffered a miserable fate due to the two world wars and the dissolution of the EME, and the confiscation of its collections. The legacy is now in the care of two institutions. Lajos Martin's folder is kept by the Romanian State Archives, Cluj County Directorate, and the floating wheel is in the Transylvanian National History Museum.. A digitised version of all this, together with the material collected over the years, is available as the Lajos Martin Collection, together with the literature about him, in the EDA (Transylvanian Digital Repository) run by EME. [1]

3. Studies (training), (secondary school) teaching activities of Lajos Martin

Lajos Martin was born on 30 August 1827 in Buda, the seventh child of a family of twelve. He began his education as a home-schooled pupil and continued his studies at the Lutheran school in Buda. Even then, as a student, he had already taken a big interest in astronomy under the influence of one of his teachers. He then went on to study at the Catholic High School in Buda, where he acquired a high level of mathematical knowledge. During his university years, he showed great interest in various fields, studying two years at the Budapest University of Science in the humanities and two years at the University of Art and Engineering. He interrupted his studies at the outbreak of the War of Independence in 1848. Lajos Martin volunteered for the army, taking up arms for the ideal of freedom. After World War II, he hid for a time from the vengeance of the retaliating powers. He was captured in 1849 and after a few weeks of captivity was recruited as a soldier in the Austrian army.

After the suppression of the Revolution, between 1849 and 1851, he was a school servant in Naples at the military school. He was then transferred to the technical officers' school in Naples, where his superiors soon recognised his mathematical talent - he gave mathematics lectures to the students as a pastime - and transferred him to the military engineering academy. At the Vienna Officers' Academy, he was assigned to the last class for his outstanding knowledge. He became a first lieutenant and then was appointed teacher of geometry, engineering and architecture at the technical school in Krems at the age of 27. It was here that he made his first invention in 1856, the design of the rotary rocket. At the same time, he designed a rotary military propeller, which so impressed the Austrian high command that he was commissioned to build a navigable dirigible. Martin did not accept, because he saw the future of aviation in dynamic flight.

He left the army in 1859 and returned to Hungary. He tried his hand at private engineering in Buda. His excellent engineering design, submitted for a public tender, was noticed by the city council and he was elected chief city engineer. „At the end of 1860 he became the chief engineer of Buda, but at the beginning of the provizórium he resigned and became a teacher at the Körmöcbánya Real, where he served until the establishment of the University of Cluj.” [2]. Between 1859 and 1861 he worked as a private engineer in Budapest, then he also qualified as a teacher. In the meantime, Lajos Martin was elected a corresponding member of the Hungarian Academy of Sciences on 27 November 1861, and in 1862 he presented his thesis entitled The Forces of the Wing of a Bird.

Qualified as a teacher, he took his final examinations on 5-6 October 1862: written questions in quantitative science and power engineering, and then a written exam on 9 October, in addition to the above subjects, in German, geography, history and natural science.

In 1863, he became a teacher at the Real School in Körmöcbánya. On 9 October 1863, Lajos Martin passed the examination as a candidate teacher of geometry and geometric drawing at the elementary school in Körmőczbánya. This is evidenced by the test certificate: „Mr. Lajos Martin, teacher of Secondary School, is hereby declared fully qualified to teach Quantitative, Mechanical and Mechanical Engineering in German and Hungarian language highschools!" [3].

Subsequently, between 1864 and 1868, he became teacher at the Real School of Bratislava and at the Catholic High School. In the school year 1864-65, Lajos Martin taught quantitative science in classes IV, V and VI and mechanical engineering in class VI in the mixed-religion main school. He was also head of class V. [4]. He also taught quantitative science at the Main School in Bratislava in the academic year 1866-67 in classes IV, V and VI, and was also the head teacher of class IV. [5] Commissioned by the Minister of Education, he wrote a textbook in Hungarian on quantitative, geometric and descriptive geometry..

In 1868 he was a telegraph office manager in Pest, then in 1869 deputy director of the telegraph office in Debrecen.

In 1871 Lajos Martin moved to Cluj-Napoca, where he was appointed director of the telegraph office, and in 1872, at the age of 45, he was asked to become senior professor of mathematics at the University of Science in Cluj-Napoca. He served in education for 25 years until his death. In the 1890s, Lajos Martin lived in *Gyár* Street (today Eminescu street) in Cluj-Napoca (at the end of *Fürdő* Street), across the street from his friend Farkas Gyulai.

4. Lajos Martin, the engineer-researcher

He became more interested in aviation in the last decade of his life. Due to space limitations, we will present only a few data in chronological order, which give an idea of his research work in the field of aviation: In 1871-1875 he made his first model of a flapping-wing aeroplane; in early July 1893 he made a model of his floating wheel; in October 1893 at the EME meeting in Cluj-Napoca Martin presented the first model of the "floating wheel", in 1893 he patented the floating wheel; in 1894 he published his work The floating wheel compared with the Wellner wheel. On 31 March 1896, his patent No. 81,303 was registered in Germany; in 1895, he also made a speech as rector in which he stated that flight was the most important task of science; on 30 August 1896, he tested the floating wheel in the garden of the University of Cluj.

5. Lajos Martin and the Transylvanian Museum Association

Lajos Martin was a founding member of EME. He was a frequent lecturer and published the results of his research in EME's scientific publications. He embraced the EME creed and took every opportunity to actively participate in events, but he even contributed to the development of the collections, for example, in one record he donated 20 minerals to the mineral collection of the Unitarian school in Cluj [7].Lajos Martin's close relationship with the EME was not in vain, since in addition to his teaching and academic work, he found a suitable background for his aviation research, which he considered his heart's desire, both for the presentation of his results and for their publication and dissemination. His family was well aware of this when they wished to deposit his legacy at the EME: the floating wheel and its accompanying documentation in a folder. The Lajos Martins folder is a collection of 291 pages of documents. His biography, patents, correspondence, descriptions of inventions, drawings and related correspondence, as well as correspondence from him and his grandson of the same name. The documents are mostly in Hungarian or German, but also in English and French. The documents in the folder date from 1871 to 1913

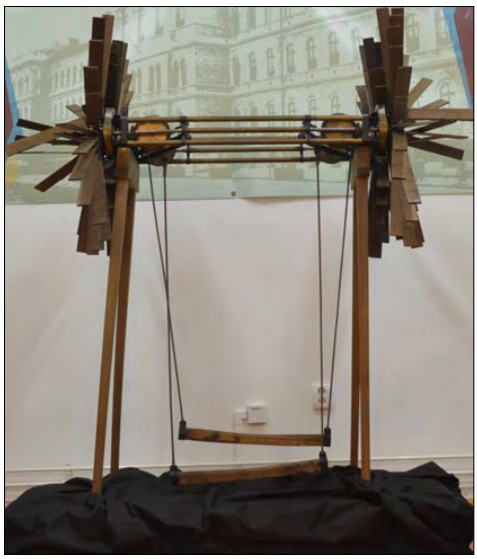


Figure 2. *Floating wheel of Lajos Martin (Foto: Bitay, 2013)* [6]

6. The role of Lajos Martin in Hungarian university education in Cluj

On 29 September 1872, he was one of the first to be appointed a full professor.: „On 29 September, in Ischl, His Majesty appointed as teachers at the University of Cluj... 3) for the Faculty of Human and Real Sciences, János Szamosi, Otto Hóman, Sándor Imre, Hugo Meltzl, Béla Szász, Lajos Felméri, Károly Szabó, Gedeon Ladányi, Henrik Finály, Lajos Martin, Antal Abt, Antal Fleischer and Antal Koch..” [8] about the proposal of the Hungarian Ministry, of the newly established University of Cluj and its appointed teachers, the *Budapest Közlöny* [9] and the *Magyar Polgár* [10] journals also report.

The observatory in Cluj Napoca operated between 1832 and 1872 under the direction of the piarist mathematical-astronomical teachers.. When the University of Cluj was established, the supervision and scientific management of the observatory was entrusted to mathematics professor Lajos Martin. Martin, appreciative of the old instruments, tried to add modern ones, two delta tubes, a theodolite, a comet finder and a pendulum clock. Between 1872 and 1885, the observatory was used by the university and the high school. Lajos Martin taught astronomy to university students in the observatory until 1893, when it was demolished along with the old university building. It was no longer located in the newly built university building, now the central building of the Babeş-Bolyai University. (A new observatory with modern equipment was established on *Tordai* road in 1924.) [11]

Lajos Martin was the first Vice Dean of the Faculty of Mathematics and Natural Sciences between 1872 and 1873, he taught elementary astronomy 3 hours per week, higher calculus 5 hours per week, integral calculus 5 hours per week, upper calculus 2 hours per week, astronomy 1 hour per week, application of external calculus (now differential calculus) to geometry 5 hours per week..

Lajos Martin is mentioned in the *Almanach* of the University as a "public ordinary teacher" between 1873-74, as a member of the Teachers' Examination Committee of the Secondary School, as a full member of the Hungarian Royal Society of Natural Sciences and the Hungarian Engineers' Society. His residence is listed as 8 Linczeg Street. At the university, descriptive geometry was taught continuously until 1918 [12]**.** Lajos Martin started teaching in the school year 1872/73 "descriptional geometry ", and in the second half of the school year 1873 he taught the subject of descriptive geometry for two hours a week. In 1875, he also taught projective theory, the theory of complex functions, calculus of variations and geometric drawing at the university, according to the university's *Almanach* [13].

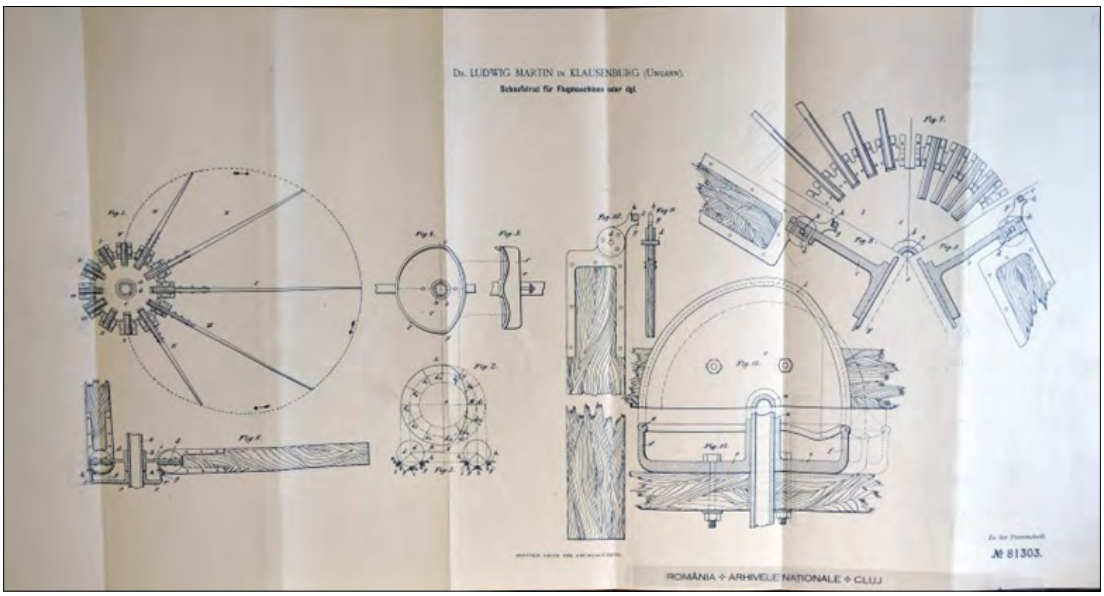


Figure 3. *Drawing of Lajos Martin's floating wheel [Source: Martin-mappa]*

7. Publications for teaching: books, notes

Lajos Martin's manuscripts for teaching purposes in his legacy testify to the time and attention he devoted to the preparation of his teaching materials. Thus we can find notebooks, manuscripts and printed manuals in the fields of mechanics, quantum mechanics, descriptive geometry and calculus of variations. Let us look at the five manuscripts below:

– Notebook. Notizen-Buch [14]
– Mechanics notes. Manuscript [15]
– Guide to teaching freehand geometrical drawing [16]
– The geometrical drawing according to patterns [17]
– Variatio calculation [18]

7.1. The notebook, NOTIZEN-BUCH, 1852

The notebook is a manuscript in German, consisting of 1 envelope, 49 written pages and 9 blank pages (30 sheets in total). The notebook, NOTIZEN-BUCH, dates from 1852, the writings contained therein are undated. We can only be certain that the entries were made in 1852 or later. No date or place of publication is given. During this period, Martin was a student at the technical officers' school in Naples.

The manuscript is believed to be a teaching note.

The first part of the note is a description of the theory of finite differentials, followed by a section on vector summation and then the theory of permutations. The following chapter, "Fundamenten des Analysis", discusses the properties of functions. This is followed by static torque, and then various statical problems, among which I think I can discover the calculation of the friction of a rope in a suspended pulley, the calculation of the centre of gravity of a circular slice, and the study of a cylindrical body moving down a ramp. The next chapter of the note introduces the basics of fluid mechanics. The note concludes with a section on finite differentials of multi-variable functions. It is interesting to note that most of the note is devoted to finite differentials, while the flow theory section is based on differential calculus

7.2. Mechanics notes

Manuscript, in a booklet of 42 pages (33 written and 9 blank) (21 sheets in all). No date of publication or location where he was at the time and wrote this note. Manuscript, which may have been intended as a teaching note.

The mechanics-notes starts with an introduction to the basic concepts of dynamics. He formulates the equations of motion on the basis of differential theory, and then moves on to a discussion of motion in a central force field, which he calls "central motion". This is followed by a description of the laws of motion of the Solar System. These are followed by the motion of the planets, presumably in elliptical orbits, the oblique deflection in unresisted or resistive media, and the periodic motion of bodies, presumed to be spherical, on various plane curves under the influence of gravity. The chapter is called "On pendulum motion".

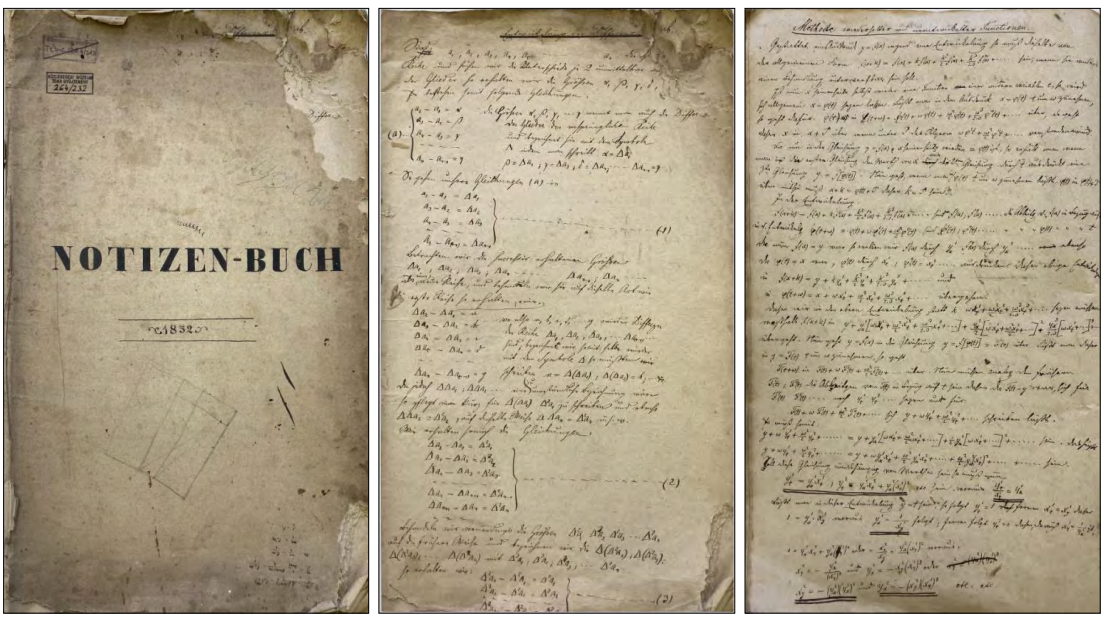


Figure 4. *The cover of Lajos Martin's notebook cover and the first and 42nd pages. (1852)*

The note concludes with a chapter on the motion of the material point system.

7.3. Guide to teaching freehand geometrical drawing

The book is a guide to teaching freehand geometric drawing, a handbook for teachers who are already familiar with the subject but need to supplement their theoretical knowledge with practical exercises. The book is therefore a rich collection of forms from which the teacher can choose the most suitable for teaching and putting into practice the subject matter. The 28-page manuscript contains 295 (geometrical) graphs (drawings): I. The straight line, II. The closed perimeter graphs, III. The regular polygons, IV. The simplest applications of regular polygons, V. Star-shaped polygons, VI. Applications of regular and star-shaped polygons, VII. Lines of overall dimensions, VIII. Application of the contour, IX. Including the chapters on straight line roses.

7.4. The geometrical drawing according to patterns

This note was originally intended to be entitled: Guide to teaching geometricál drawing according to patterns. It has been crossed out and corrected to read: Geometrical drawing by patterns. It is intended for use in gymnasiums and industrial schools.. At that time Lajos Martin was a full professor at the Main School of Economics in Bratislava, a full member of the Society of Engineers and a corresponding member of the Hungarian Academy of Sciences. („Martin Lajos a mennyiségtan rend. tanára a pozs. vár. Főreáltanódának, a m. tud. Akadémia lev. –; a m.k.term.tud társulat s a magy. Mérnök-egylet rend. Tagja”).

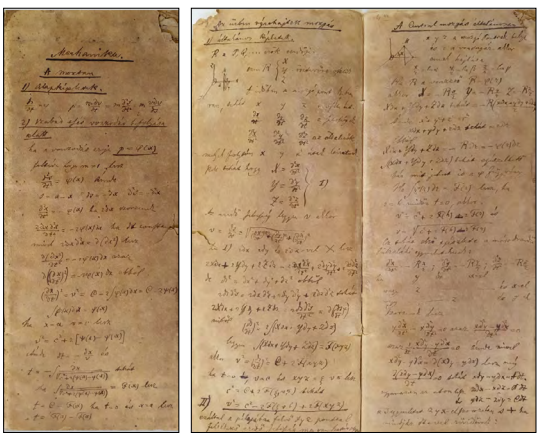
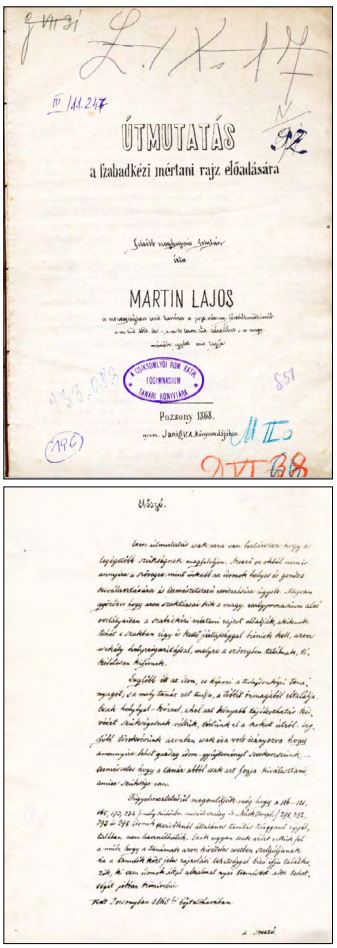


Figure 5. *Pages 1 and 6-7 of Lajos Martin's manuscript Mechanika.*

The book, which is a continuation of the previous one (Guide to teaching freehand geometrical drawing), contains 13 sheets of text and 200 geometric forms. It is a guide to teaching geometric drawing from patterns and how to use wire and wood patterns for teaching freehand geometry in the teaching of illustrative geometry.

7.5. Variatio calculation

His notes in Hungarian attest to the importance he attached to education in his mother tongue. Lajos Martin wrote in the foreword to his Variatio Calculus handbook: "The present book is intended to serve only as a handbook for my lectures, ignoring the higher needs and owes its existence only to the fact that there is not one of our textbooks written in Hungarian which deals with variation calculus adequately". The Variatio Calculation is therefore



6. ábra. *Cover and first page of Lajos Martin's manual " Guide to teaching freehand geometrical drawing ", with the foreword.*

a handbook to accompany the lectures, which is also a niche, because there was no other textbook written in Hungarian that discusses variation calculus in sufficient detail. The handbook is based on Strauch's two-volume work [19] but does not follow Strauch's theory of variational calculus in all respects, and supplements it where necessary. He intends his manual to be a resource, an aid to the development of a better variational calculus.

8. The role of Lajos Martin in the management of the university

Lajos Martin also took a role in the management of the university, and "was dean of the faculty of mathematics and natural sciences in 1877/8, 1882/3, 1883/4 and 1891/2. In 1872/3, 1878/9, 1884/5, 1886/7, 1887/8 and 1892/3 he was the vice dean of the university, and in 1895/6 he was the rector of the university" [20]. [13, 21, 22]

As already mentioned, Lajos Martin was appointed the first Vice-Dean of the Faculty of Mathematics and Natural Sciences between 1872 and 1873. [23] Since the foundation of the university, he has therefore held intermittent positions of leadership, as vice-dean, dean, and finally rector in 1895/96. At that time, the leadership positions were one-year terms, alternating, for example, from Vice Dean to Dean, then from Dean to Vice Dean, thus maintaining continuity in leadership, with long-term plans and guidelines.

On his way to the top of the university's leadership, in his rectorial inaugural speech in 1895, he discussed his own field of research, identifying aviation as the most important task of sci-

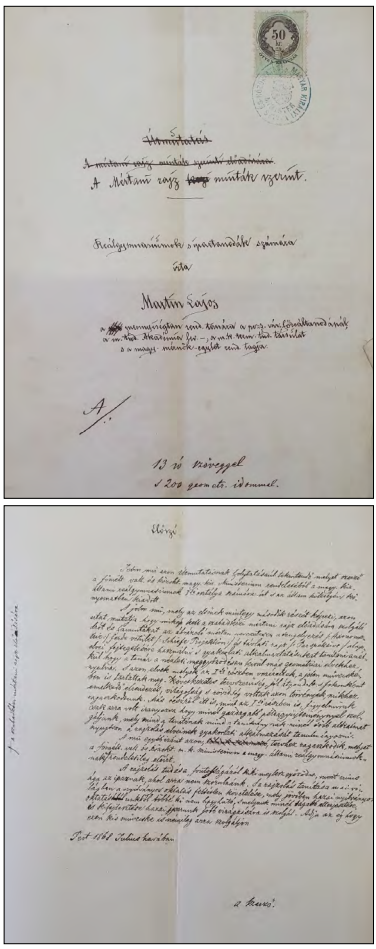


Figure 7. *Cover and first page of the manuscript of Lajos Martin's The Geometrical Drawing by Patterns with the preface (Pesta, 1868 july)*

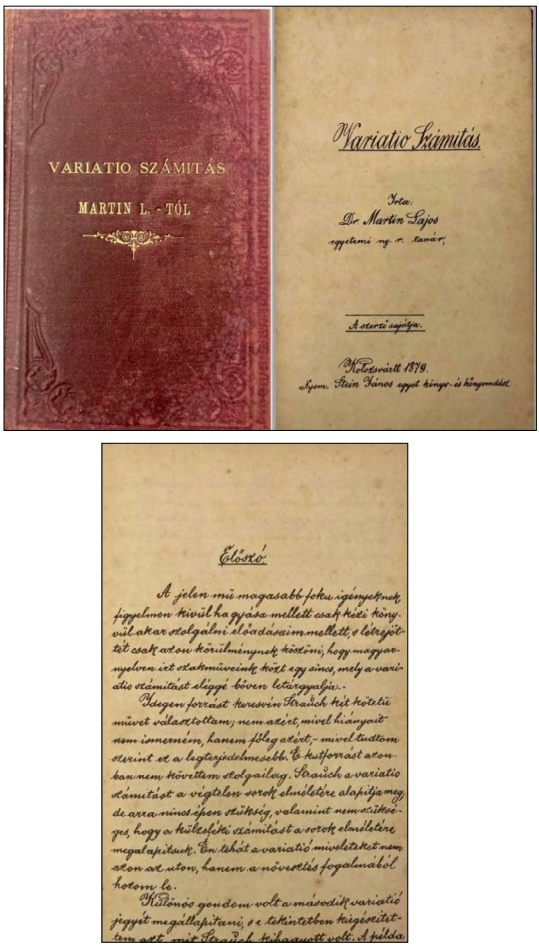


Figure 8. *Inside and outside cover of Lajos Martin's handbook Variational Calculation, fragment of the preface (Cluj, 1879. may)*

ence. We might think that this was a day of joy for him, when he was at the height of his career, when he could talk about his favourite science as rector, but it was not a day to experience his complete success, a peaceful moment. All this was overshadowed by a sad family tragedy. In Sándor Márki's diary of 15 September 1895 we read the following note: "... we attended the opening of the university, this time in the completed eastern wing of the university's own central building. The new rector, Lajos Martin, had caught up with the fate of recent rectors, and had to give his inaugural speech in the knowledge that one of his daughters was lying in a coffin...". [2] For Lajos Martin's eldest daughter, his second-born child Zsuzsanna (b. 12/12/1866, Bratislava) died in her 29th year on 14 September 1895, the day before the opening, after a long period of suffering. Her funeral was held on the afternoon of 16 September 1895, "with great condolences" [24] .

It is important to stress that Lajos Martin was not only an inventor, mathematician, mechanic and pioneer of the idea of flight, but also an excellent teacher. For half a century (25 years of which he spent at the University of Science in Cluj-Napoca) he taught and educated generations to think scientifically. Teaching ha beend his life-long vocation, whether as a school servant, military officer, teacher in a real school or as a university teacher (professor).

9. Lajos Martin in the Lutheran parcel of the Házsongárd cemetery in Cluj

Lajos Martin died at 5 o'clock in the morning of 4 March 1897. His funeral was held on 6 March in the Lutheran cemetery of Házsongárd in Cluj. Dr. Gyula Farkas, Dean of the Faculty of Mathematics, gave a eulogy at the funeral. In the diary of Sándor Márki we read this note: "In today's issue of Kolozsvár I wrote anonymously about his death: 'His human masterpieces wanted to ascend into the air / And while he himself remained below, his soul flew into the sky. / He now knows the way and whispers to his descendants from there / The great secret that lifts the terrestrial to the sky". [2]

10. Conclusions

To successfully bring a technical creation to life, the genius, dedication and persistence of the creator are not always enough; it is equally necessary to have the right conjuncture, the right people and the power of shared recognition to breathe life into the invention and launch it into the world of application..

Unfortunately, there was no national interest in the "invention(s)", and the researcher was not willing to sell it abroad, so he struggled to develop it as long as he could, with limited financial resources. A review of the results of his very rich scientific work, which was linked to aviation, reveals a scientist who was well ahead of his time, although some of his calculations were incorrect. He tried to be open on controversial issues, but this does not detract from the value he had, and it is our task, the task of posterity, to appreciate, value and preserve his memory at all times. It is important to identify, organise and preserve the technical heritage that we have. It is primarily an inspiring example for the younger generation, but it is also a rich source of ideas and further research.

Acknowledgements

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Figure 9. *Restored tombstone of Lajos Martin in the Házsongárd lutheran cemetery.*

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