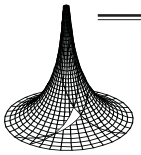

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Teaching
Mathematics and
Computer Science

Béla Kerékjártó (A biographical sketch)

György Gáll

Abstract. Kerékjártó published more than 70 scientific papers mainly in the field of topology. He achieved his most important results in the classical transformation topology and in the theoretical research of the continuous groups. He was the author of three books: Vorlesungen über Topologie; Euclidean geometry; Study on the projective geometry.

Key words and phrases: topology, theoretical research of the cotinuous groups, Euclidean geometry, projective geometry, University of Szeged, University of Budapest.

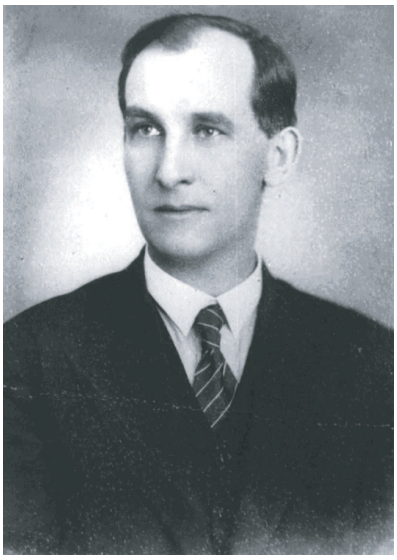
ZDM Subject Classification:

In 2001 we had the 55^{th} anniversary of the death of Béla Kerékjártó. In 1998 he would have been 100 years old. Although he was one of the greatest Hungarian mathematicians of the last century, few people in Hungary ever heard about him. His name is rarely mentioned even among teachers of mathematics.

On looking up again my old university manuals, I found only a brief reference to Kerékjártó's scientific work in the postscript in the book of György Hajós, Introduction to Geometry.[1, 2]

I wrote this paper in order to keep alive the memory of an outstanding geometer prematurely deceased in his late forties. It is the result of my twenty-years research work. Of course, in a biographical note like this one cannot give full details about a man's life, but I think I managed to discover the most important events of Kerékjártó's life on the evidence of the available documents and on the basis of the recollections of his relatives and colleagues.

I had to content myself with exposing only the most important results of Kerékjártó's research-work. The list of his papers and books seems to be complete by now, but the possibility of some contributions of lesser importance still turning up cannot be excluded.



The assistance of those who gave me a lot of useful information is hereby gratefully acknowledged. I am greatly indebted to Mr. Béla Kerékjártó Jr., who provided me with detailed informations about his father's scientific activities and private life. I offer my sincere thanks to the late professor Barna Szénássy who directed my attention to Kerékjártó and thoroughly checked all the details in this paper.

I am also indebted to Sándor Gacsályi who read the manuscript and contributed to giving it its final shape.

The life of Béla Kerékjártó

Béla Kerékjártó was born in Budapest on the 1st of October 1898. He came from an ancient but impoverished noble family. His father, who was a puritan man, changed his name from Vetsey and Csáthy Kerékjártó Károly to Kerékgyártó Károly. He was known to be an antihabsburg citizen. He married a commoner girl[3], thus avoiding nomination as royal chamberlain.

The family lived in Újpest. Károly Kerékgyártó graduated as a mathematics teacher but he had also a diploma in engineering, and he worked as a town engineer in the capital. He deceased in 1901. After his death his wife, Berta Holzer, brought up all alone Béla and his two sisters, Gizella and Margit.

On completion of his primary studies in 1908, he went to the State Grammar School in Újpest. At the end of the first schoolyear – except for two subjects – he passed his examinations with credit. As for the subject physical education, he was given only a satisfactory mark, and he got only a four from mathematics.[4] In the following years he was always given excellent marks, so he was granted exemption from school fees till the end of his studies.[5]

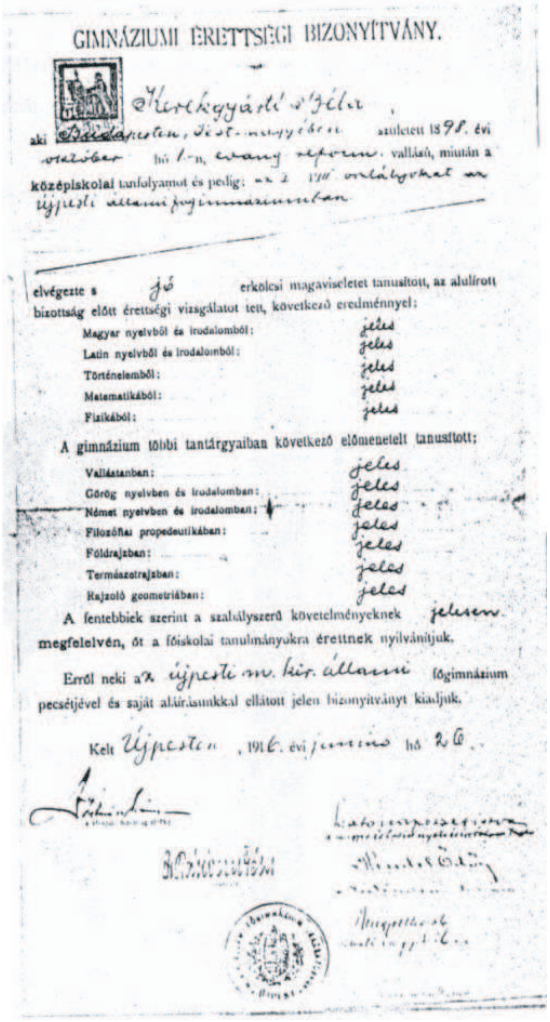
His talent for mathematics unfolded gradually. When attending the sixth class, he gave a lecture on material of the eight class at the school literary and debating society.[6]

During the math lessons he got rarely asked, but if so he always gave a comprehensive lecture on the topic.[7] While still at grammar school, he sent one of his compositions to professor Brouwer. Ignoring the age of the author, Brouwer wrote back to "prof. Dr. Béla Kerékjártó".[8] As a boy in the top form of the grammar school, he began to study mathematics from university lecture notes written in German.

He had a special aptitude for learning languages. His acquaintance with several languages is due not only to his outstanding talent but also to his strong will-power.

He learnt German from his mother who spoke it fluently, using the standard literary language, not the Austrian dialect. The mastery of Latin helped him a lot with the learning of Spanish, Italian and French. He had a retentive memory: in the early forties of the last century he could translate the works of Tacite and Horace into Hungarian without using a dictionary. He improved his English in Lausanne while spending his holidays with the Young family. At the same time he kept improving his French which he began to learn in the grammar school. Later he regarded French as his second mother tongue. When a grammar school boy he decided to study Italian in order to be able to read Dante in the original. Then in the forties he gave lectures at Rome University in Italian.[9]

Like his younger sister, Gizella, he had a feeling for music. First he started to play the violin, then he took up playing the piano. Concerning the interpretation of classical music he advocated the same principles as Dohnányi. He became personally acquainted with Ernő Dohnányi[10] in Princeton some years later. Dohnányi suggested that Kerékjártó should be a professional piano artist,



GIMNÁZIUMI ÉRETTSÉGI BIZONYÍTVÁNY.

aki [illegible] született 1898. évi
[illegible] hó 1-n, [illegible] vallású, miután a
középiskolai tanfolyamot és pedig: az 1. 1910 osztályokat az
újpesti állami fogimnáziumban

elvégezte s jó erkölcsi magaviseletet tanusított, az alulírott bizottság előtt érettségi vizsgálatot tett, következő eredménnyel:

Magyar nyelvből és irodalomból:	jeles
Latin nyelvből és irodalomból:	jeles
Történelemből:	jeles
Mathematikából:	jeles
Fizikából:	jeles

A gimnázium többi tantárgyaiban következő előmenetelt tanusított:

Vallástanban:	jeles
Görög nyelvben és irodalomban:	jeles
Német nyelvben és irodalomban:	jeles
Filozófiai propedeutikában:	jeles
Földrajzban:	jeles
Természetrajzban:	jeles
Rajzoló geometriában:	jeles

A fentebbiek szerint a szabályszerű követelményeknek jelesen megfelelvén, őt a főiskolai tanulmányokra érettnek nyilvánítjuk.

Erről neki a[illegible] újpesti m. kir. állami főgimnázium pecsétjével és saját aláírásunkkal ellátott jelen bizonyítványt kiadjuk.

Kelt Újpesten, 1916. évi junius hó 26.

Certificate of baccalaureate of Béla Kerékjártó

but luckily for the mathematicians of the world, he did not accept the suggestion of Dohnányi. Owing to his decision the world became richer by an outstanding mathematician. Then he felt attracted more and more by the play of Cortot[11] and the technical difficulties of romantic piano playing did not keep him back from the interpretation of Chopin. He was versed in musical theory, too.[12] After

1918 he had no time for piano playing, and later he did not find any pleasure in it.[13]

On the 15th of March 1916, on the national commemoration day, the schoolleaver Béla Kerékjártó delivered the festive speech.[14]

On the 26th of June he passed successfully his schoolleaving examinations. He was given very good marks from all subjects.

For his results he obtained the prize of a fund endowed for the remuneration of meritorious pupils.[15] Having finished his studies in the secondary school he immatriculated at the faculty of arts of the University of Sciences in Budapest. He wanted to become a teacher.[16] At the university he attended mainly lectures on mathematics and physics. He was taught by well-known university teachers.

First page of the lecture book of Béla Kerékjártó

This is a list of the courses of lectures attended by Béla Kerékjártó during his university studies.

Manó Beke:	"Theory of elliptic functions" "Theory of substitutions" "Absolute geometry" "Variational arithmetic" "Spherical trigonometry" "Some chapters from the domain of analysis"
Lipót Fejér:	"Arithmetic of extreme values" "Theory of Fourier's and Laplace's series" "Differential and Integral Calculus" "Theory of functions" "Conformal transformation of plane and twisted surfaces" "Determination of extreme values"
Mihály Fekete:	"Infinite series" "Real variable functions"
Mihály Demeczky:	"Algebraic equations"
József Suták:	"Analytical geometry"
Lajos Dávid:	"Historical development of the theory functions"
Lóránd Eötvös:	"Experimental physics"
Izidor Fröhlich:	"Theory of light" "Theory of phenomena of electric induction"
István Rybár:	"Experimental optics"
Ernő Fináczy:	"History of Education"
Bernát Alexander:	"History of Philosophy" "Psychology"
László Négyesy:	"An outline of the history of Hungarian Literature"
Sándor Domanovszky:	"The development of society in Hungary"
Zsigmond Simonyi:	"Hungarian Syntax"

He took also part in exercises headed by Jenő Klupathy and Pál Dienes.[17]

In the academic years 1916–17 and 1918–19, he had been examined in every semester in the subjects below and had received very good marks.[18]

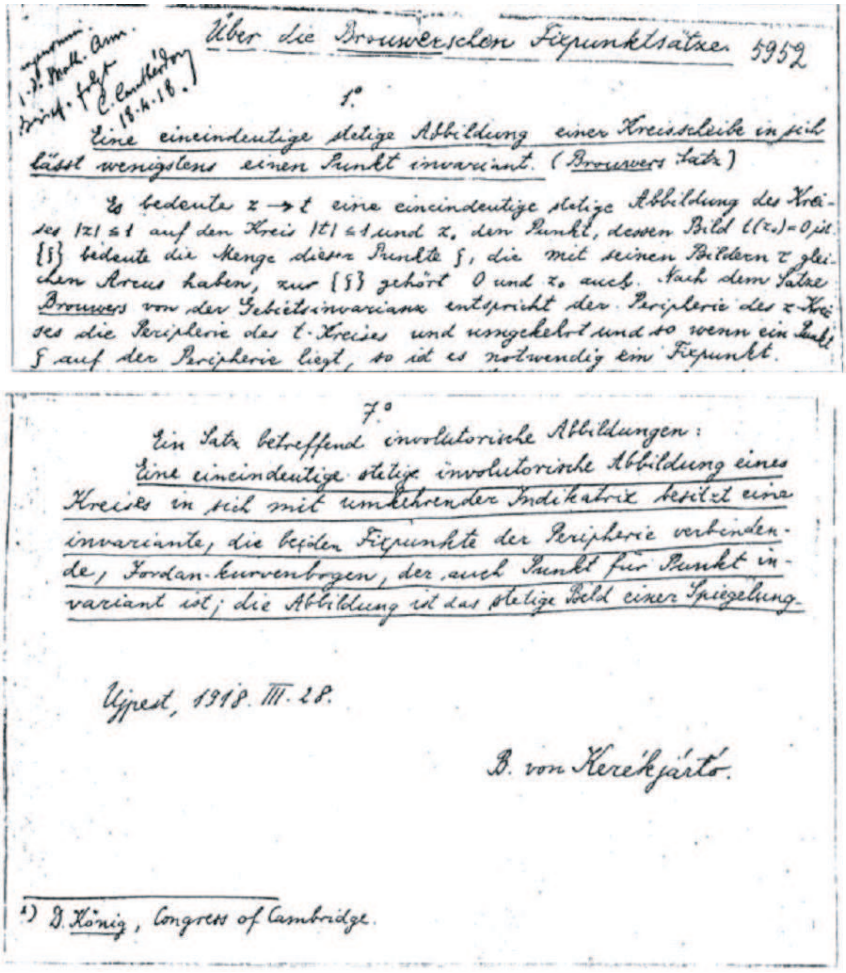
Béla Kerékjártó's index (academic year 1916/17 semester II.)

From the 1st of May to 31st of October 1917 he had been staying in Újvidék, where he took part in the torsion pendulum experiments of Eötvös Lóránd.[19]

He registered for the following session, too. He had paid 83 kr tuition fee for the first semester, but he did not pass any exam. He broke off his studies, because he was given permission by the Minister of Education to write his thesis for his doctors degree.[20]

He ended his first paper on the 28th of March 1918. It bears the title: "Über die Brouwerschen. Fixpunktsätze". Carathéodory, the editor of Math. Annalen accepted it for publication.[21] His first three papers appeared in the 80th volume of Math. Annalen in 1919.

He took up the original family name used by his grandfather and he signed his name as Béla von Kerékjártó.[22]



Über die Brouwerschen Fixpunktsätze.

1°

Eine eineindeutige stetige Abbildung einer Kreisscheibe in sich lässt wenigstens einen Punkt invariant. (Brouwers Satz)

Es bedeute $z \to t$ eine eineindeutige stetige Abbildung des Kreises $|z| \leq 1$ auf den Kreis $|t| \leq 1$ und z_0 den Punkt, dessen Bild $t(z_0) = 0$ ist. $\{\xi\}$ bedeute die Menge dieser Punkte ξ, die mit seinen Bildern z gleichen Abstand haben, zur $\{\xi\}$ gehört 0 und z_0 auch. Nach dem Satze Brouwers von der Gebietsinvarianz entspricht der Peripherie des z-Kreises die Peripherie des t-Kreises und umgekehrt und so wenn ein Punkt ξ auf der Peripherie liegt, so ist es notwendig ein Fixpunkt.

7°

Ein Satz betreffend involutorische Abbildungen:

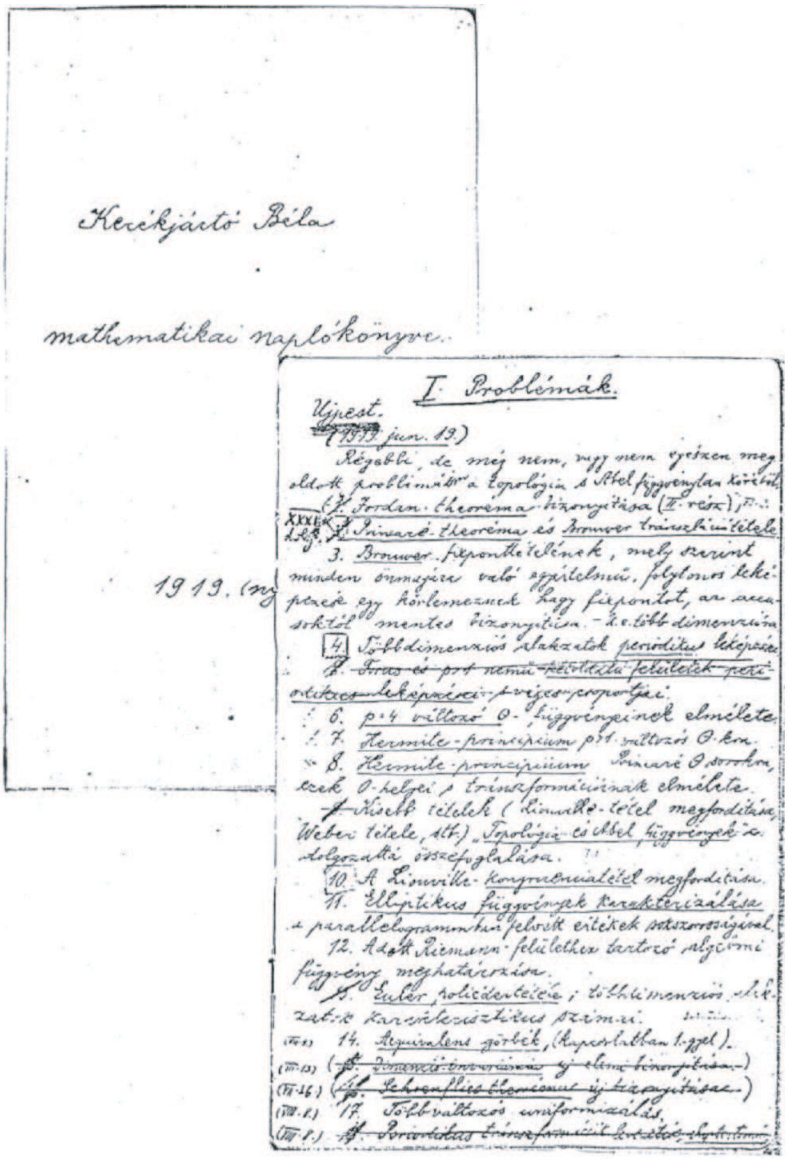
Eine eineindeutige stetige involutorische Abbildung eines Kreises in sich mit umkehrender Indikatrix besitzt eine invariante, die beiden Fixpunkte der Peripherie verbindende, Jordan-kurvenbogen, der auch Punkt für Punkt invariant ist; die Abbildung ist das stetige Bild einer Spiegelung.

Ujpest, 1918. III. 28.

B. von Kerékjártó.

[1]) D. König, Congress of Cambridge.

First lines of the first publication of Béla von Kerékjártó and his signature



Title-page of Béla Kerékjártó's diary . . . and its first page

In the summer of 1919 he bought a hard cover writing book which served as a diary. He put down his first notes on the 19th of June 1919 in Újpest and

the last ones in Budapest in 1944. He entered in his diary the most important things he was interested in, most often in the language of the country where he was staying.

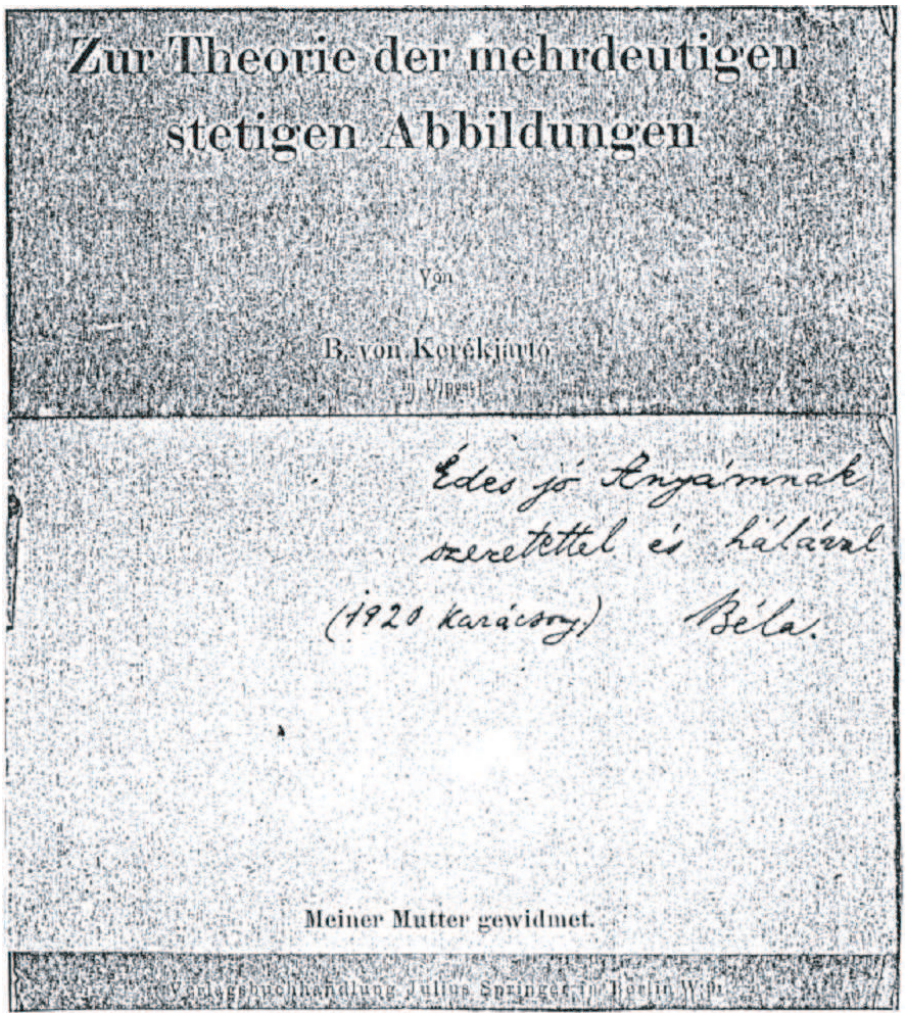
He presented his doctoral dissertation "About the transformations and finite groups of the circle and the spherical surface"[23] at the end of the year 1919 at Budapest University. The defence of his thesis took place on the 16$^{\text{th}}$ of January 1920.[24] He was conferred the degree of doctor on the 14$^{\text{th}}$ of February 1920.[25] (The manuscript of the doctoral dissertation had been lost and a printed copy has not been found either.) On the 26$^{\text{th}}$ of February of the same year he left Újpest. He spent a week in Vienna, then he left for Berlin. He had been staying in that town from the 3$^{\text{rd}}$ of March to the 17$^{\text{th}}$ of September. On the 18$^{\text{th}}$ of September he left for Göttingen, then the next day for Bad Nauheim. Hearing a lecture of J. Radon at the Naturforscherversammlung of Bad Nauheim he got acquainted with the theorem of Helly, which he managed to prove some years later.[26]

Béla Kerékjártó in September 1920 in Bad Nauheim,
in the company of mathematicians, congress participants

His doctoral dissertation was presented in September 1920. On the first of October he travelled to Lausanne and remained there till the 20$^{\text{th}}$ of March 1921

with the Young family.[27] He brought to perfection his knowledge of French and English there.

He loved his mother very much. His love for his mother is expressed by the following gracious words we can read in his dedication of his paper "Zur Theorie der mehrdeutigen stetigen Abbildungen": "to my beloved mother, with love and gratitude". (Berlin, Christmas, 1920) Béla.[28]


Zur Theorie der mehrdeutigen stetigen Abbildungen

Von

B. von Kerékjártó

in Wien

Édes jó Anyámnak szeretettel és hálával (1920 Karácsony) Béla.

Meiner Mutter gewidmet.

Verlagsbuchhandlung Julius Springer in Berlin W 9.

Title page of his essay dedicated to his mother

He returned to his home in Újpest on the 21st of March. The summer of that year he spent at the *puszta* Hortobágy preparing for his Privat docent examination. Until the 21st of November 1921 ten of his studies were published in domestic and foreign scientific reviews.

He was qualified as a lecturer at the University of Sciences in Szeged; he passed an examination at the end of the term on the 12th of December. He gave his first lecture as a privat docent on the 15th of December. His first lecture was entitled: "About the topological bases of analysis and geometry".[29]

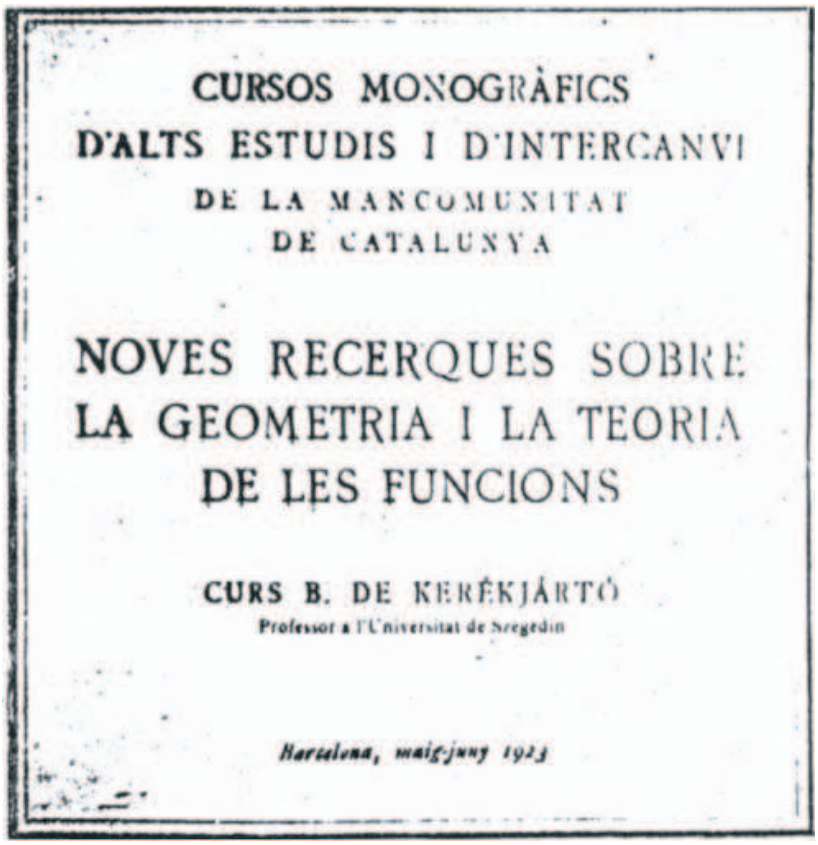
The minister of Education assented to his appointment as Privat docent for the subjects *analysis and geometry*. So he became Privat docent of the Szeged University.[30]

At that time in Szeged a real mathematical centre was being formed by the outstanding mathematicians A. Haar, F. Riesz and Gy. Szőkefalvi Nagy. They established the scientific review Acta Litterarum ac Scientiarium which contributed to the propagation abroad of the results of Hungarian mathematicians.

In the spring of that year Kerékjártó worked at Szeged University. He gave lectures on "The theory of sets", "The elements of topology" and "Linear transformations".

On the 20th of May he travelled to Göttingen. Göttingen was then the centre of European mathematics, where in the twenties the most outstanding mathematicians of the age centered round David Hilbert.[31] At Göttingen University at the summer course Béla Kerékjártó gave lectures entitled "Vorlesungen über kritische Topologie". Some years later he elaborated the material of his series of lectures in his book "Vorlesungen über Topologie".[32] This work, which appeared in Berlin in 1923, can be considered as a pioneer one and it was unique in its kind. This is the first syllabus of surface topology and it inspired the mathematicians to further investigations in this branch of mathematics beginning to develop.

After finishing the series of lectures in September 1922 he took part in the "Leipziger Naturforscherversammlung" and he gave a lecture entitled "Hauptsatz der Flächentopologie bei unendlich hohem Zusammenhang". On returning to Göttingen he gave lectures entitled "Mathematische Betrachtungen zur Kosmogonie" during the winter course.[33] Meanwhile one after the other there appeared his newer essays. He published not only in French and German but also in English.[34] On the 27th of December he broke off his stay in Göttingen and he visited Breslau (now Wroclaw, this town was known as Boroszló for Hungarian people). He went back to Göttingen on the 4th of January 1923.



Invitation card to Béla Kerékjártó's series of lectures held in Barcelona

On the 28th of March he returned home to Újpest. On the 25th of April, nearly a month later, he went back to Göttingen, then, on the 4th of May, via Frankfurt he travelled to Barcelona. Between the 18th of May and the 30th of June he gave a series of ten lectures at the "Institud d' Estudis Catalans", entitled "Noves recerques sobre la Geometria i la teoria de les Funcions". In June and July he gave lectures entitled "Funcions".

On the 5th of September he returned from Barcelona to Göttingen. He had been preparing a whole month for his lectures which he planned to give in the United States of America. On the 5th of November he went on board in Hamburg; he arrived in Princeton on the 22nd of November. In the academic year 1923–24 he worked there with a Rockefeller scholarship. He was provided an

opportunity to give lectures on topology and continuous groups. The titles of his lectures were: "Lectures on topology", "Surfaces in the space R_3", "Open surfaces", "Intuitionistic theory of sets".[35]

Accepting an invitation to Sorbonne University he left Princeton on the 21st of May 1924 and via New York he travelled to Paris. Between the 14th and 20th of June he gave a series of lectures entitled "Leçons sur la topologie et ses applications", compelling with them the admiration of the most outstanding French geometers.[36]

On the 21th of July he went back to Göttingen. He stayed there till the 7th of August, then, on the 8th of August he travelled to Bensheim for a little rest. On the 18th of August he returned to Újpest.[37] He remained there till the 14th of November, then he went back to Göttingen and went on giving his lectures.

On the 6th of December 1924 he married Liselotte Krohnbauer.[38] He went with his wife on a honeymoon to Goslar. On the 23th of December the new couple travelled back to Göttingen. After spending there a little time Kerékjártó took ship in Hamburg on the 8th of January 1925 and on the 21st of January he went back to Princeton, where he gave "Lectures on continuous groups" between the 5th of February and the 15th of May. In recognition of his work he was appointed to a titular professorship at Princeton University.[39] While he was there he met Albert Einstein, too. They were speaking mostly about music.[40]

His stay in America was not limited to Princeton. Whenever he had time he made journeys throughout the States. He turned up four times at New York University, then he visited Buffalo, Chicago, Washington and Baltimore.

On the 18th of May he travelled back to Europe. He arrived in Hamburg on the 2nd of June via Kopenhagen. It was there that he gave a series of lectures, entitled "Vorlesungen über kontinuierliche Gruppen" between the 2nd of June and the 30th of July.[41] On the 1st of October he returned to Göttingen to his wife, then, after a little rest he was called by his work to Strassburg. On the 15th of October he travelled to Milano and Venice with his wife in order to have a longer rest. After finishing their holidays they went back to Göttingen.

It was there that he received the letter of appointment N. 96.308/1925. IV. on the 30th of November 1925. It contained that he was appointed associate professor of geometry and descriptive geometry at the University of Szeged, at the same time he was also made director of the Institute of Geometry and Descriptive Geometry.[42] István Lipka, an old friend of the Kerékjártó family, became

his assistant. The mathematical school in Szeged acquired an international reputation. A lot of foreign students went there, many of them with a Rockefeller scholarship.[43]

At that time he was member of the Matematikai és Fizikai Társulat, the Deutsche Mathematiker – Vereinigung and the American Mathematical Society. Furtherly, he was also member of the National Academy of Science and that of the geometric committee of the National Research Council.[44]

After his appointment, in 1926 he moved to Szeged and he rented a flat. He taught in Szeged and worked on his publications. In the following two years he travelled abroad with the only aim to have a longer rest. (Bruckmühl, from July 6, 1927 to August 18, 1927). But he never broke off his relations with outstanding foreign mathematicians. His name was well-known, especially in France.[45] He was on friendly terms with Élie Joseph Cartan. It was Cartan who presented most of Kerékjártó's essays at the Parisian Academy.[46]

His daughter, Margit was born in Szeged, on April 30, 1926.[47]

Kerékjártó always chose the topic of his lectures with great care. He let his students into the secret of several important branches of geometry. In Szeged he held the following colleges: "Analytical Geometry", "Projective Geometry", "Introduction to Descriptive Geometry", "Higher Geometry", "Higher Projective Geometry", "Geometrical Group Theory", "Topology", "Sketches in Analytical Geometry".[48]

"His lectures were very attractive. He entered the room hastily, with clumsy, hobbledehoyish movements, his eyes lighting and he shuttled up and down. After saying "Ladies and Gentlemen", he took a piece of chalk and began to talk quickly. He wrote and wrote the letters on the blackboard, but meanwhile he turned short and looked at his students. I think I remember well, that despite of his dispatch we could make notes in a satisfactory way. He always gave his lectures by heart, he never used notes. The examinations were carried on in a friendly atmosphere. He was fair in giving marks. He asked the better students to solve such problems that weren't strictly involved in the direct material of the lectures given by him but on the basis of attained knowledge they could be easily solved. He was able to arouse his students' interest in his subject, who attended his courses with pleasure. He was on good terms with his students. He was too polite by half, it was difficult to greet him first" – writes Mrs László Kalmár in her recollections.[49]

Kerékjártó was member of the board of examiners for candidates to schoolmastership and gave lectures at the Secondary School Post-graduate Institute.[50]

This photograph of historical value was taken in Szeged, in 1928.
Standing line (from left to right): Frigyes Riesz, Béla Kerékjártó,
A. Haar, Dénes Kőnig, R. Ortvay.
Sitting line: J. Kürschák, G. D. Birkhoff, O. B. Kelogg, Lipót Fejér
Third line: T. Radó, I. Lipka, L. Kalmár, P. Szász
(From the collection of Rezső Kunfalvi)

He knew the latest special literature. He wrote more than thirty book reviews for the Acta Litterarum ac Scientiarum. First of all he reported about books written in German and published by the editors B. G. Teubner and J. Springer. Most of them were works dealing with geometry, but among them were some on algebraical even philosophical subjects.

He published his references generally in the following year after the book came out. Besides German works he presented five books published in New York and some published in Paris, Madrid, Warsaw and Luxemburg.

He was dealing not only with mathematics. He knew also the latest results in physics, chemistry and biology.[51]

In 1928 he travelled to Italy. This trip lasted from September 2 to October 10. In Bologna he took part in the international mathematical congress and gave a lecture entitled "Note on the general translation theorem of Brouwer".

On May 16, 1929 he was invited again to Paris and was asked to give lectures at the Sorbonne.[52] In the summer of the same year he made a study tour in Göttingen and Hamburg.

His son Béla was born in Szeged, on September 11, 1929.[53]

On October, 10, 1929 Kerékjártó got his appointment to a full professorship.[54]

On November 3 he travelled to Munich, then to Paris where he spent a month. In his lectures held at the Sorbonne he was dealing with the actual problems of topology.

After coming home, apart from a trip to Zurich (September 4–11, 1932) he did not travel abroad for six years. The summer of the years 1932 and 1933 he spent at Szilvásvárad, the summer of the year 1934 in Lillafüred.

He was on good terms with Albert Szent-Györgyi and with Dezső Miskolczi, professzor of medicine. Beside Miskolczi's clinic there was a tennis-court where they used to play.

In 1930 he became member of the Research Committee of Natural Science and of the Geometric Committee of the Société Mathématique de France.[55]

The 38. volume of the Matematikai és Fizikai Lapok was published in honour of the 70. birthday of Gusztáv Rados. In this Festschrift nearly all outstanding Hungarian mathematicians brought out essays. Béla Kerékjártó wrote on "The topology of open surfaces".

In 1932 and 1933 he organized a seminar for professors, assistants and some secondary school teachers. His talented students were invited there, too.[56]

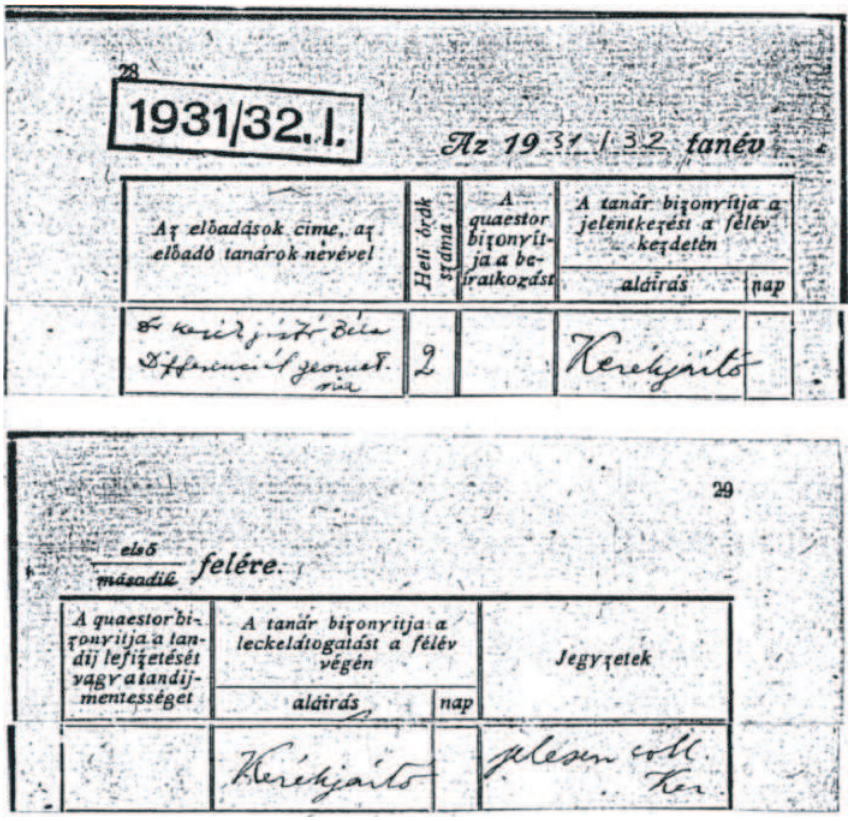
In 1933 died Alfred Haar, one of the editors of Acta Litterarum ac Scientiarium. After his death Béla Kerékjártó redacted this scientific review with Frigyes Riesz.[57]

The Eötvös Lóránd Matematikai és Fizikai Társulat on his 38$^{\text{th}}$ general assembly held on June 10, 1933 elected Béla Kerékjártó member of the committee in place of Dénes Kőnig.[58]

In the academic year 1933/34 he was dean of the faculty of mathematical and natural sciences.[59] On speech-day he gave a lecture on "Natural laws and mathematics".

Between July 2–7 1934 he gave six lectures on the "Foundations of Geometry" in a post-graduate course for secondary school teachers. His lectures were published in stencilled form.

Owing to his international prestige and his special knowledge in the domain of topology, this new branch of geometry which started to develop rapidly, he was asked to write the chapter entitled "La topologie" of the world-famous Encyclopédie Française. He was the first Hungarian scientist invited to take part in the redaction of the Encyclopédie Française. The manuscript was finished on December 22, 1934 and it was printed in the first chapter of the Encyclopédie in 1937. Kerékjártó summed up the most important notions of topology in 7 pages.



His signature in the index of Darvas Andorné Piroska Dobozi

The Hungarian Academy of Sciences elected him Corresponding member on May 11, 1934. His recommenders were: Gusztáv Rados, Károly Tangl, Lipót Fejér, Rudolf Ortvay.[60] His inaugural lecture was on the "Theory of regular transformations of surfaces". He took part in the work of the relevant section of the Academy.[61]

In the academic year 1934–35 he was prodean of the faculty of Mathematical and Natural Sciences.[62]

In 1935 he bought a site at Mátrafüred. He wanted to have a self-planned villa built with local masters. Since the realization of his plans would have been very costly, he despaired of carrying them into effect and the plans of a building engineer named Barnabás were executed. (His villa was later pulled down and a new house has been built in the place of the old one). He usually spent the summer holidays there.

The stay in Mátrafüred meant for him recreation after a hard year at the university. He worked quietly and with pleasure on such works that he had had to lay aside during the academic year. His students some times visited him at Mátrafüred (first Peter Hun from Szeged, then a young guest from the U.S.A.).[63]

In the summer of 1935 the family Kerékjártó moved to a five-room flat.[64]

On March 21, 1935 he was invited to Geneva University. He stayed there in an elegant apartment house. Between 18–30 October he gave lectures on topological problems and had professional talks with Swiss mathematicians.[65]

Valéry and Kerékjártó

In July of 1936 took place in Budapest a Congress on Intellectual Cooperation of the League of Nations with the participation of Duhamel, Huizinga, Thomas Mann, Piaget, Pál Teleki and many other outstanding scientists, writers and artists. It was there that he met his friend Paul Valéry, the poet of distinction.

"During his stay in Budapest he asked me to give a lecture at the Descartes-Congress in Paris the following year. In the pauses of the sessions in Budapest we talked a lot about modern geometry. Out of gratitude for the invitation I dedicated him my lecture on "Descartes et la géométrie moderne". He thanked it very much" – wrote Kerékjártó in the scientific review Budapest.

On June 13 the participants of the congress made an excursion to Esztergom. They had their lunch on the terrace of the Bath Hotel. After lunch "two men were walking around the swimming-pool, untiringly. The frail Valéry and the tall Kerékjártó, the short-lived, highly-gifted mathematician. It is only mathematics that fascinates the French poet. They have been walking probably for an hour, in vivid conversation. Everybody looks at this strange couple!" – wrote László Passuth in his book "Machicolation".[66]

Paul Valéry wrote about his relation to Kerékjártó in his work "Fascicules": "Professor Kerékjártó came to see us from Szeged University. Seems giant, he bends almost double out of respect for me. He's young. I'm looking at that expressionless, analytic face – the glance of the dark black eyes – and we are immersed in his trade – the Analysis Situs. He expounds his principles and discoveries".

In the summer of 1936 he spent 10 days in Oslo. He took part in he mathematical congress and gave two lectures, entitled "Topologie des transfromations" and "Sur la géométrie hiperbolique".

In the months April and May of the following year he made a longer study-trip in Western Europe visiting the following cities: Göttingen, Brussels, Liège, Paris, Strasburg, Lausanne, Geneva. In Switzerland he met Rolin Wavre and George De Rham, Swiss mathematicians, and had professional talks with them.[67]

In that year he was elected corresponding member of the Société Royale des Sciences de Liège.[68] His reference was Lucien Godeaux (1887–1975) professor and head of department of geometry at Liège University. His son, prof. J. Godeaux professor of the biological institute of Liège University remembers him as follows: "I met Kerékjártó before the Anschluss at a dinner where we all admired his excellent manner of speaking French and his mastery in foreign languages."[69]

In the summer of 1937 he visited Paris twice (from July 4 to 12 and from July 30 to August 7). In the autumn he spent a week at Warsaw University and acquainted the Polish mathematicians with the results of his research-work.[70]

In the same year, with the financial support of the MTA he published in Szeged in his own edition the first volume of his work which was planned to be a five-volume one on the foundations of geometry, entitled "The elementary

structure of Euclidean geometry". This work gives a very important founding to Euclidean metrical geometry.[71]

On December 3, 1937 he was invited to Budapest University.[72] In the summer of the following year, between July 10–22 he represented in Geneva the minister of Education in the Intellectual Cooperation Committee of the League of Nations. (Kerékjártó was the secretary of the Hungarian National Committee of Intellectual Cooperation).[73]

On July 28, 1938 he was elected associate professor of higher geometry at the University,[74] and he moved to Budapest. He became the leading professor of the mathematical seminar (Lipót Fejér was the director).[75,76,77]

The Kerékjártó family lived in this house from 1938

At Budapest University he held the following colleges: "Geometric Group Theory", "Analytic Geometry", "Analytic Geometrical Skills", "On the elements of Geometry", "Projective Geometry", "Algebraic Geometry", "Differential Geometry", "Spherical Geometry", "Topology", "Non-Euclidean Geometry", "Mathematical Repetitorium", "Mathematical Proseminar".[78]

Giving a lecture at Budapest University

Between July 14–22, 1939 again in Geneva he represented the minister of education in the Intellectual Cooperation Committee of the League of Nations.

In April of the year 1940 he was given the Zsigmond Kornfeld reward of the Hungarian Academy of Sciences for the first chapter of his book "Foundations of Geometry".[79]

Paul Valéry invited him to Nice in May 1940 to give lectures in the series of lectures of the Centre Universitaire Méditerranné about the following topic: "La vérité sur les rapports profonds de la musique avec la mathématique." This plan could not have been realized because of the war events.[80]

In November 1942 Kerékjártó led the Hungarian delegation at the mathematical conference in Rome. His lecture was on: "Topologia dei gruppi di transformazioni delle superfizie."

In the forties he had contacts with French teachers and university students escaped from Germany to Hungary as prisoners of war. The president of the Society of French Prisoners of War escaped to Hungary, Mr Paul Lemaire, said at the Hungarian Institute in Paris on February 7, 1946:

"After having regained my health and having slowly recovered my equanimity I decided to continue my studies and to travel to Budapest. The secretary of the university arranged a meeting between me and a university teacher, named Mr Kerékjártó, who was an admirer of France and a good friend of Paul Valéry. I'm speaking with pleasure about him, because he was the most modest and the most brilliant man I have ever met. After his lecture I walked up to him in order to ask him some pieces of good advice. He was unthinkably kind to me. He mentioned his French friends and he asked me to go and see him the following day. "If you are so minded to speak some time about mathematics, come and see me on Thursdays. I arrange my affairs in such a way that I have some free time." France must be more or less generous towards me, – I said – but being a refugee from Germany, my pockets are so empty, that I can't afford to take private lessons. He claimed in deep indignation, that he considered great joy and honour to have opportunity to speak to somebody French and it was equivalent to any payment. Such a knowledge can't be paid after its value. Judging that I was in trouble he proposed the following bargain. "My daughter is now beginning to learn French. If you don't mind, after the maths lessons I'll call her in to let her listen to our conversation." So, each Thursday, after four maths lessons the professor went out for his wife, his daughter, for tea and fancy biscuits and I paid him crunching sweets, listening to his witty and fascinating report of experiences about his adventures he had once had in France and in the whole world."[81]

On May 30, 1944 on the suggestion of Rudolf Ortvay, Jenő Egerváry, Lipót Fejér, István Rybár and Frigyes Riesz, Kerékjártó was elected associate member of the Hungarian Academy of Sciences. [82] On the same day became members of the Academy Béla Bartók and Zoltán Kodály.

In 1944 the Academy published the second volume of his work "Foundations of Geometry" which bears the title: "Projective Geometry". In this 600-page book systematized with a refined taste he dwelt on the most important questions of projective geometry. In each of his following three volumes he would have dwelt at length on the newest domains of geometry.[83] It was a great loss for Hungarian mathematics, that these books did not appear in print. After September 1, 1944 he had been staying in his villa in Mátrafüred. Thus he managed to avoid being sworn in on the Szálasi-government. On November 19, when the front reached Mátrafüred, he moved to the T. B. sanatorium in Mátraháza. His younger sister and his brother-in law worked as physicians in the sanatorium and his mother lived there, too.[84] Kerékjártó lived in Mátraháza until the end of February 1945. He tried to make himself useful in the life of the sanatorium. The employees of the sanatorium found him sympathetic, decent, friendly and helpful.[85]

After the liberation of Budapest he began to work at the university among adverse circumstances. He held his lectures in rooms with broken windows. When he had time he went back to Mátraháza to his family on occasional vehicles of transport or on foot.[86] All this was not good for his health.

On June 1945 the family moved to Budapest and settled there, in one of the examination rooms of the faculty of literature and arts. Gyula Kornis, the Rector of the University at that time let Kerékjártó's family have this room for use.[87] He could not return to his flat on the Ráth György street, because it was hit four times by artillery-fire and became inhabitable: the majority of the furniture or other household devices were lost or came to nothing. The examination room was furnished with the remaining things.[88]

In the same year Kerékjártó was elected president of the Hungarian-French Society.[89] The Hungarian Academy of Natural Sciences held it festal founders meeting on September 6, 1945. Among the forty Academy-members we can find Béla Kerékjártó.[90]

This year G. W. de Rham invited him again to the mathematical department of the Geneva University, but Kerékjártó refused to accept this charge.[91]

On September 1945 he began to watch himself because of night sweats; he had a high temperature, he had a natural disposition to catch cold, he lost more than 16 pounds during a couple of weeks. He was examined by the doctors in the central clinic of OTBA, and they advised him to work less. He stayed home, but his younger sister and his brother-in-law urged him to go to Mátraháza for a general medical check-up. In the fall of October he had 38°C–39°C degrees

of fever. On November 12 he was examined in the Rusznyák clinic, the doctors found tuberculosis of the lungs and he was sent to T. B. sanatorium.

He arrived in Mátraháza on November 29. After an improvement for a short time the patient's state of health grew worse.[92] His Switzerland friends tried to help him through the International Red Cross, but in vain. Finally they booked him a ward in a Switzerland T. B. sanatorium in case he was fit to travel abroad.[93]

He agreed to undergo an operation on February 11, 1946 but it could extend his life for only a short time.

He died at six o'clock a.m. on May 26, 1946.

A Gyöngyösi Református Egyházközség III. sz. HALOTTI ANYAKÖNYVÉNEK 135. oldalán a 21. sorszám alatt a következő bejegyzés található:

"Folyó szám:21. Halálozás napja 1946 május 26. Eltemetés éve napja: 1946. ~~július~~ május 28. A meghalt neve és polgári állása: Dr. v e t s e i K e r é k j á r t ó B é l a egyetemi nyilv. rendes tanár, budapesti születésü, vallása: református; Születési és lakhely: Budapest, Mátraháza.Állami Szanatórium; Neme: ffi; Életkora: 48 év, 1898. ; nős. ; Betegség, vagy a halálnak más neme: Tüdőgümőkor, Szivbénulás. ; Az eltemetőnek neve: Dr. Szurmó László lelk. és Berzétei László s. lelkész. Jegyzet: Mátraházán a Szanatórium temetőjében temettük."

Fennti bejegyzést - miután ön ezt tudományos dolgozatban felhasználandó magáncélra kérte, bélyeg- és illetékmentesen állitottam ki, illetve jegyeztem fel jelen soraimban.

Gyöngyös, 1983. április hó 25.-én. Szives üdvözlettel:

Berzétei László
lelkipásztor.

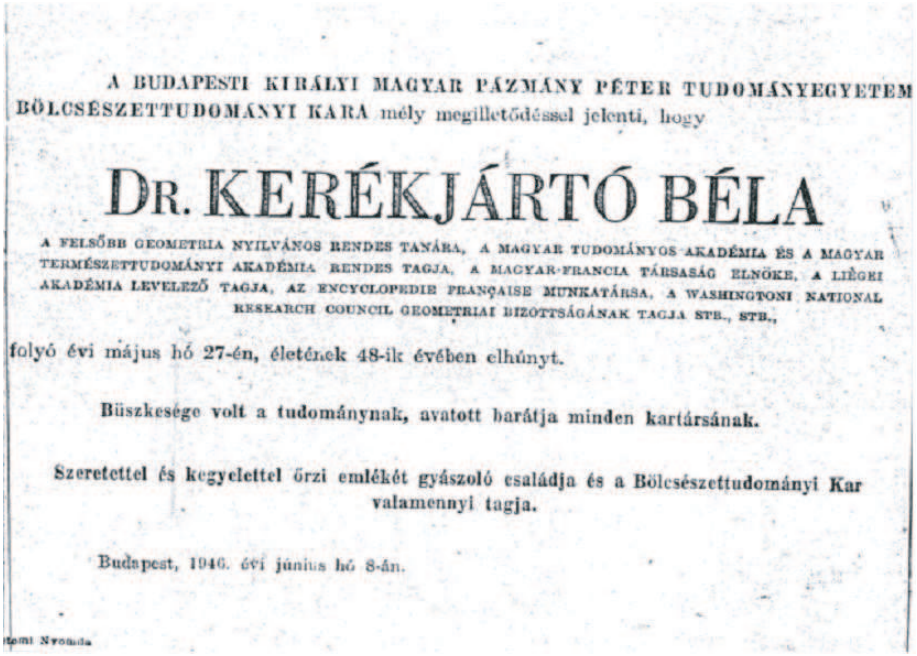
Béla Kerékjártó's register of death

Cause of death: cardiac failure.[94] He was buried in the cemetery of the sanatorium according to the funeral rites of the Reformed Church on May 28, 1946, in the afternoon.[95] According to his last will Budapest University and the Academy

were informed about his death only after his burial.[96] Beside the obituary notice published in Szeged Acta I could find an article about Kerékjártó's death only in the issue of May 30, 1946 of the Kis Újság but the data of the latter are inaccurate and its statements are fanciful.[97]

In 1957 his body was exhumed and it was reburied in the Megyeri Road cemetery of Budapest next to his father.

Budapest University issued an obituary notice but they got wrong the date of his death. Those wrong data were taken over by N. N. Bogoljubov.[98] The Academy itself did not issue any obituary notice.



A BUDAPESTI KIRÁLYI MAGYAR PÁZMÁNY PÉTER TUDOMÁNYEGYETEM BÖLCSÉSZETTUDOMÁNYI KARA mély megilletődéssel jelenti, hogy

DR. KERÉKJÁRTÓ BÉLA

A FELSŐBB GEOMETRIA NYILVÁNOS RENDES TANÁRA, A MAGYAR TUDOMÁNYOS AKADÉMIA ÉS A MAGYAR TERMÉSZETTUDOMÁNYI AKADÉMIA RENDES TAGJA, A MAGYAR-FRANCIA TÁRSASÁG ELNÖKE, A LIÈGEI AKADÉMIA LEVELEZŐ TAGJA, AZ ENCYCLOPEDIE FRANÇAISE MUNKATÁRSA, A WASHINGTONI NATIONAL RESEARCH COUNCIL GEOMETRIAI BIZOTTSÁGÁNAK TAGJA STB., STB.,

folyó évi május hó 27-én, életének 48-ik évében elhúnyt.

Büszkesége volt a tudománynak, avatott barátja minden kartársának.

Szeretettel és kegyelettel őrzi emlékét gyászoló családja és a Bölcsészettudományi Kar valamennyi tagja.

Budapest, 1946. évi június hó 8-án.

The notice of Budapest University

Béla Kerékjártó was carried off by death at the height of his creative power. His unexpected death was a great loss for Hungarian Scientific life: it lost not only an outstanding scientist but also a master with a wide intellectual horizon and an indefatigable organisator. Several outstanding Hungarian scientists attended his courses and many of them will always rank themselves among his students.

We do not know what were his plans for the future, but we can state for certain, that the mathematical world was deprived of very important works by his death. One of the auditoriums of Szeged University treasures his memory.

The tomb of Béla Kerékjártó in the Újpest cemetery

His work is well-known among mathematicians abroad, and they hold Béla Kerékjártó in great esteem.[99] Unfortunately, in Hungary there was nobody to follow his work.[100]

Note

1) György Hajós: Introduction to Geometry, Tankönyvkiadó, Budapest, 1962. 584. p.
2) Róbert Oláh-Gál: "returning planets" of Transylvania – The Bólyai's; Élet és Tudomány XLV. Volume 51. number December 21, 1990. 1622–1622. p.
3) Communication of dr Béla Kerékjártó junior.
4) ibid 100. p.
5) ibid 69. p.
6) Yearbook of the Hungarian Royal State Grammar School in Újpest. Fuchs printing house, Újpest, 1908–1916.
7) Communication of Dr István Lipka.
8) Communication of Dr Lányi Andorné dr Margit Kerékgyártó.
9) Communication of dr Béla Kerékjártó junior.
10) Ernő Dohnányi (1877–1960) world-famous Hungarian piano artist, composer, conductor of orchestra and outstanding pedagogue. Teacher at the Academy of Music, later its director, leading conductor of the Hungarian Philharmony. In the years 1925–27 he spent a longer time in the U.S.A. He emigrated in 1945 and settled down in the U.S.A.
11) Alfred Cortot (1877–1962) outstanding French piano artist. His play was characterized by large-scale musical intellect, well-balanced, clean form, chiselled detail-work and gentle timbre. He was superior to others mostly in the interpretation of Schumann's, Chopin's and Debussy's works.
12) Béla Kerékjártó: La visite de Paul Valéry á Budapest (Visit of Paul Valéry in Budapest), Budapest Magazine. 1945. 2^{nd} number, 58^{th} p.
13) Communication of dr Béla Kerékjártó junior.
14) Yearbook of the Hungarian Royal State Grammar School in Újpest Fuchs printing house, Újpest, 1916. 82. p.
15) Yearbook of the Hungarian Royal State Grammar School in Újpest Fuchs printing house, Újpest, 1916. 51. p., ibid.

16) Yearbook of the Hungarian Royal State Grammar School in Újpest Fuchs printing house, Újpest, 1916. 51. p., ibid.
An inquiry has been made about the intended choice of career of secondary schoolleavers. He was the only pupil in the class who chose the teacher's job.

17) The university register of Béla Kerékjártó. (In the possession of dr Lányi Andorné dr Kerékgyártó Margit.)

18) ibid.

19) Communication of dr István Lipka.

20) ibid.

21) Copy of the original manuscript with the sign of Carathédory (in possession of the author).

22) ibid.

23) Mathematische Zeitschrift, 8. vol. Berlin, 1920. 317. p.

24) Diary of Béla Kerékjártó (in the possession of dr Béla Kerékjártó junior).

25) ibid.

26) Béla Kerékjártó: About the Helly-theorem Mat. és Term. Ért. 38. volume 1921. 415. p.

27) Diary of Béla Kerékjártó.

28) Reprint of the essay with the dedication of Kerékjártó (in possession of the author).

29) Acta Litterarum ac Scientiarium, 1. vol. Szeged, 1922. 46–53. p.

30) Diary of Béla Kerékjártó.

31) Győző Kovács: How did János Neumann become "father of the computer?"

32) Necrology of Béla Kerékjártó. Acta Scientiarum Mathematicarum, 11., Sze ged, 1946. V-VII. p.

33) ibid.

34) Note on continuous transformations, Proceedings London Math. Soc. (2) 22., 1923. 270–274. p.

35) Diary of Béla Kerékjártó.

36) Necrology of Béla Kerékjártó. Acta Scientiarum Mathematicarum, 11., Sze-ged, 1946. V–VII. p.

37) He lived at $N^0 6$ Dobó Street in Újpest.

38) Publication of dr Béla Kerékjártó junior.

39) Szeged University Almanac, Hungaria, Szeged, 1971. 173. p.

40) Communication of Dr Margit Kerékjártó.

41) Diary of Béla Kerékjártó.

42) Almanac of the Hungarian Royal University of Arts and Sciences, 1925–26. Szeged, 1926. 61. p.

43) Rezső Kunfalvi: One hundred years ago was born the pioneer of modern physics in our country: Rudolf Ortvay (1885–1945).
Természet Világa 116. volume, 1st number January, 1985. 16. p.

44) Almanac of the Hungarian Royal University of Arts and Sciences 1925-26, Szeged, 1926.

45) István Sőtér: Hungarian-French relations. Scientific Institute Pál Teleki, 1946. 196. p.

46) Communication of dr Béla Kerékjártó junior.

47) Communication of dr Margit Kerékjártó.

48) Curricula of the Hungarian Royal University of Arts and Sciences Ferencz József 1922-1937. Szeged

49) Recollections of dr Kalmár Lászlóné (in possession of the author).

50) Almanac of the Hungarian Royal University of Arts and Sciences, Ferencz József, 1925–26. Szeged, 1926. 61. p.

51) Béla Kerékjártó: Natural law and mathematics Szeged, 1934. (reprint).

52) Diary of Béla Kerékjártó.

53) Communication of dr Béla Kerékjártó junior.

54) Almanac of the Hungarian Royal University of Arts and Sciences, Ferencz József, 1929–30. Szeged, 1930. 74. p.

55) Almanac of the Hungarian Royal University of Arts and Sciences, Ferencz József, 1930–31. Szeged, 1931. 79. p., ibid.

56) István Vincze: In memoriam professor Frigyes Riesz, Matematikai Lapok 1991/4. 8. p.

57) Acta Litterarum ac Scientiarum VI. volume, Szeged, 1933, October 7. 1. p.

58) Matematikai és Fizikai Lapok. 1933. 106. p.

59) Szeged University Almanac. Hungaria, Szeged, 1971. 173. p.

60) Recommendations to membership of the Academy of Sciences in 1934. MTA manuscript 47. p. and Members of the Hungarian Academy of Sciences (1825–1973). Budapest, 1975. 143. p.

61) Members of the Hungarian Academy of Sciences 1825–1973 Budapest, 1975. 143. p.

62) Szeged University Almanac. Hungaria, Szeged, 1971. 173. p.

63) Communication of dr Béla Kerékjártó junior.

64) Almanac of the Hungarian Royal University of Arts and Sciences, Ferencz József, 1929–30. Szeged, 1930. 74. p.

65) Diary of Béla Kerékjártó.

66) László Passuth: Gyilokjáró (Machicolation); Szépirodalmi Könyvkiadó, Budapest.

67) Diary of Béla Kerékjártó.

68) Szeged University Almanac. Hungaria, Szeged, 1971. 174. p.

69) Remembrance-letter of Prof. J. Godeaux (possession of the author).

70) Diary of Béla Kerékjártó.

71) György Hajós: "Introduction to Geometry" (Tankönyvkiadó, Budapest, 1962) The author recommends Kerékjártó's work to his readers who are interested in the axiomatic foundations of geometry).

72) Diary of Béla Kerékjártó.

73) Recommendations to membership of the Academy of Sciences in 1940. MTA manuscript 40. p.

74) Almanac of the Budapest Hungarian Royal University of Arts and Sciences Pázmány Péter 1938–39. Budapest, 1939. 69. p.

75) Almanac of the Budapest Hungarian Royal University of Arts and Sciences Pázmány Péter 1938–39. Budapest, 1940. 107. p., ibid.

76) Magyarok a természettudomány és technika történetében (Hungarians in the history of technics and natural sciences General), editor: Ferencz Nagy, Dénes Nagy Országos Műszaki Információs Központ és Könyvtár, Budapest, 1986. 413. p.

77) Almanac of the Budapest Hungarian Royal University of Arts and Sciences Pázmány Péter 1938–39. Budapest, 1939. 69. p.

78) Curricula of the Budapest Hungarian Royal University of Arts and Sciences Pázmány Péter, 1938–1944.

79) László Passuth: Barlangképek (Cave-paintings), Szépirodalmi Könyvkiadó, Budapest, 1978. 63. p., furtherly Diary of Béla Kerékjártó and Recommendations to membership of the Academy of Sciences in 1944. MTA manuscript 46. p.

80) Béla Kerékjártó: Visit of Paul Valéry in Budapest, Budapest magazine, 1945. 2. number (November) 58. p.

81) Ego sum gallicus captivus. Magyarországra menekült hadifoglyok emlékezései (Recollections of prisoners of war emigrated to Hungary), (Selected by Endre Bajomi Lázár), Európa Könyvkiadó, Budapest, 1980. 259–260. p.

82) Members of the Hungarian Academy of Sciences between 1825–1973. Budapest, 1975. 143. p. and Recommendations to membership of the Academy of Sciences in 1944. MTA manuscript 47. p.

83) Communication of dr István Fáry.

84) His mother died in 1959, at the age of 91.

85) Communication of Mrs Ernő Szép and Mrs János Hanák.

86) Communication of László Berzétey.

87) Communication of dr Béla Kerékjártó junior.

88) ibid.

89) ibid.

90) Irodalom, Tudomány (Litterature, Science) Magazine of the Society for Hungarian-Soviet Friendship December 1, 1945. 1st volume 1st number 122. p.

91) Publication of dr Béla Kerékjártó junior.

92) Reference card of Béla Kerékjártó in the T.B. sanatorium (in possession of the author).

93) Communication of dr Béla Kerékjártó junior.

94) Reference card of Béla Kerékjártó in the T. B. sanatorium.

95) Register of Death N^0 III. of the Gyöngyös Reformed Parish, 135. p. serial number 21.

96) Publication of Mrs Andor Lányi, dr Margit Kerékgyártó.

97) I had a look at the newspapers of that time (Magyar Nemzet, Népszava, Szabad Nép, Szabadság, Szabad Szó, Világ, Kis Újság) and the numbers of May and June 1946 of the two Gyöngyös newspapers (Barátság, Gyöngyösi Néplap), but it was only the Kis Újság that published an article about the death of Kerékjártó. The above mentioned article is bearing the following

title: "How died Professor Kerékjártó, the best mathematician of the world." Subheading: "His family was not able to bury him." The following erroneous data can be found there: he was 50; professor of engineering; he died on May, 29; he will be buried by the Academy of Sciences. Correctly: he was 48 years old; professor of mathematics; he died on May 26; on May 28 he was already buried. Some exaggerated statements can also be read there: the best mathematician of the world, he was the best at French in Hungary; his work "Foundations of Geometry" is known all over the world. It is true, there are also some valid statements there: he was president of the Society for Hungarian-French Friendship; the hardships of war went a long way to make him ill; he was on good terms with Albert Szent-Györgyi.

98) N.N. Bogoljubov: Matematiki, mehaniki. Naukova dumka, Kiev, 1983. It contains the personal data of more than 1500 scientists, among them those of Béla Kerékjártó, which shows that Kerékjártó is considered to be a mathematician of great importance.

99) Communication of István Fáry.

100) László Fülöp: A tudományok királynője (Queen of the sciences). Bessenyei Kiadó, Nyíregyháza, 1977. 219. p.

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