

# Blind Man Who is Famous as a Mathematician

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**S**TONE BLIND from his birth, but notwithstanding this great handicap, a world-recognized authority on the so-called higher mathematics, Lewis B. Carll of Brooklyn, is shortly to issue in book form the result of twenty years of research over the most abstruse mathematical problems ever conceived by the mind of man.

This book will look like so much Greek or Sanskrit even to the man who prides himself on his knowledge of algebra and geometry. When it is given to the mathematical world it will be found that, for the first time, many of the problems that have defied solution since the days of the ancient calculator who shouted "Eureka" on a certain memorable occasion have been interpreted logically and correctly by a man whose pupils include well known college mathematical professors and who has been consulted by such eminent authorities as Prof. Simon Newcomb.

This will be Mr. Carll's second book. His first was issued in 1881, after ten years of study and research. It has 568 pages and is called the "Calculus of Variations." It is the only book of its kind extant and has been out of print some years, for there are not many mathematically inclined persons who care to wrestle with the variations, to say nothing of differential and integral calculus, before which the average mind quails. The demand for the second book will be even smaller, by reason of the fact that it will deal exclusively with several isolated points that Mr. Carll was unable to make clear in his first work. "But now," he said the other day as he sat in the library of his Brooklyn home, "now, after twenty years of hard and continual work on these most difficult of all problems, I have solved them at last. And just think, please, that in return for all these years of patient and delicate research I shall not receive a cent. My first book netted me \$250. Two hundred and fifty dollars for ten years' labor, not a cent for twice ten years' toil! But the fame—ah!"

It was his desire for a reputation, limited though it might be to a small circle, that led Mr. Carll to take up a line of work that hundreds of eminent mathematicians from Euclid down either have solemnly avoided or given up in despair as being unsolvable by them.

When Mr. Carll graduated from Columbia university, in 1870, pressing Seth Low, now mayor of New York, hard for first honors, he wanted to become a teacher of the classics. To that end he had worked with infinite patience in an institution for the blind and all through his college course. He first had to have someone read Greek and Latin to him, then he had to transcribe the passages by means of the point system of writing for the blind, then he had to learn his lessons like any other student.

Mr. Carll's lessons were read to him by a classmate, who was sent through college by Mr. Carll's father in order that he might be eyes to his son. Most of the reading was done on the train while the two students traveled between the college and Mr. Carll's father's farm at Whitestone, Long Island, the blind student's companion being the son of a neighboring farmer. Then in the evening Mr. Carll would study over the lessons that he had taken down in the point system of writing. On Saturdays his companion would read to him for six or eight hours, and in this way Mr. Carll managed to keep ahead of outside work.

After he had done all this and thoroughly equipped himself as a classical scholar he could secure no pupils who were looking forward to the degree of B. A. Instead, all who came to him at his father's home wanted instruction in mathematics.

"Naturally," said Mr. Carll the other day. "I was sorely disappointed, but I wanted to be independent, so I taught mathematics, in which I had never prided or distinguished myself. As time went on more pupils came to me; I became more interested in mathematics; I studied its branches as earnestly and enthusiastically as I had my Latin and Greek, which now were deserted. Pretty soon, after I had mastered differential and integral calculus, I found that nobody knew very much about calculus of variations, except that there was such a branch. Then I said to myself, 'Why don't you find out something about it, and perhaps, if you do, you'll gain some fame.' So, when I could find time between students, I struggled in the new field. Now I am known to all mathematicians by my works, but the general public hasn't heard much about me, and I never expected it would. Still, I feel that I have done what I set out to do and I am satisfied."

"How have I worked? How have I done it?" A smile played on the speaker's gentle face. "Ah, it is a long story, but if you want to know, I'll tell you.

"Well, when I began to look up the subject of calculus of variations I found, to my amazement, that only one book on the subject ever had been published in the English language. It had appeared in 1851, and was from the pen of Prof. John H. Jellet of the University of Dublin. But, try as hard as I could in this country and Europe, I could not secure a copy of it. The book seemed to have disappeared.

"There was nothing left for me to do except to gather my necessary working material from all sorts of sources here and abroad, so I set to work in earnest. New York's libraries possessed at that time



LEWIS B. CARLL WORKING OUT PROBLEMS IN CALCULUS WITH THE AID OF A SLATE FOR THE BLIND.

scarcely any of the books that I needed in my researches. Therefore I was compelled to send out postal cards to the libraries at Yale and Harvard and in Europe, asking if they had certain mathematical books and journals. When they replied in the affirmative I then asked for the loan of the books and papers, the officials of Columbia university guaranteeing the libraries that I would take good care of their precious and rare documents. In this way I secured my necessary working data. This took, all told, about three years.

"But after I had the books, how could I make use of them, you will ask. Well, my brothers, and one in particular, Addison, were very good to me. I trained them how to read mathematics and once every two or three days I'd get one of them to read for about five minutes to me. If the book was in a foreign tongue, as often it was, I had first to translate it. Then I'd tell him to stop, after which I'd lock myself in my room and while pacing up and down the floor think it over, arrange and rearrange hundreds of times, and apply to the problems I had in mind the matter that had been read to me. Sometimes it would take me a week to secure a complete understanding of the few lines that I had listened to. After I had grasped it all I would have Addison read another short passage and once more I'd lock myself up and think. In this way I worked out my first book and my second, except that in the case of the latter I did not have to look up material, for I had all that I needed in my first work."

Mr. Carll paused and pointed to his sightless eyes. "Of course, they kept me from using pen and paper in my tasks," he said, "so I have had to carry every intricate problem—and there are hundreds of them—in my mind. One problem I turned over in my head for three years before I wrote it down in the point system. It covers pages upon pages in my first book, but as I solved it step by step my memory stored it away to bring it forth in all its completeness when at last I had the answer and was ready to write it all down. And I believe that, if all the copies of my book and the plates and the manuscript were to be destroyed, I could produce the book again by calling my memory into service. Once these problems get into my head they seem to stay there in all their minute details.

"In such manner I produced the copy for both my books. As the point system of writing is based on punctures in paper made by a stylus and are similar to holes made by a pin point in paper, you can readily see how long I was about the task, especially when you bear in mind that I had to create in this writing all the many different characters used in the 'Variations.'"

"Of course, after I had written down the problems some one had to transcribe them in ordinary writing. My brother Addison wrote the first book for me; my wife has just finished this task with the second. When the proofs of my first book came Addison read them to me and made the corrections that I ordered. Only a half-dozen mistakes have been found in the book in all these years and these are mis-spelled words.

"In addition to my memory I have had recourse to the slate for the blind.

"This slate is a square board cut up

the eight trigonometrical functions, sine, co-sine, versed-sine, co-versed, tangent, co-tangent, secant and co-secant.

"It is only on rare occasions however, that I use the slate. I much prefer to solve problems while pacing my room, and I have to sit down when I work with the slate."

Here Mr. Carll raised a warning hand. "But don't envy me my memory," he said, laughing. "I fear that, for many ordinary uses it isn't much good. Why, do you know that it's a fact that I cannot do simple problems in addition, subtraction, multiplication and division in my head? When I want to figure up my living expenses, for instance, I am compelled to seek aid of my slate. Strange, isn't it?"

"Neither am I a lightning calculator, as you might be led to think from my mathematical reputation. I work with painstaking slowness from sheer inability to grasp things mathematical quickly. I do believe that my brain, when it is wrestling with figures, moves as slowly as that of a boy just beginning to learn the significance of the multiplication tables."

Mr. Carll is going to call his new book "Afterthoughts on Calculus of Variations." These "Afterthoughts" deal with the most formidable problems known in mathematics, which also have a formidable sounding name—isoperimetrical problems. Robbed of technical language, they are problems that have to do with equal perimeters, but what they have to do with equal perimeters dependent knoweth not, though he listened attentively to a detailed and simplified explanation by Mr. Carll.

Although Mr. Carll gained immediate fame after his first book appeared, he is known personally to very few of the mathematicians. The absence of sight has kept him from attending the gatherings of the learned men of figures, but it has not prevented him from instructing eminent scholars by mail. Prof. Simon Newcomb, the famous scientist and astronomer, is representative of the men who have sat at Mr. Carll's feet.

Mr. Carll is a fellow at Columbia university. His friend, Mayor Low, with whom, during college days, he was wont to sojourn at Fritz's, a one-time famous resort for Columbia students, secured Mr. Carll the fellowship in recognition of his work. Every year he delivers a course of lectures at the university to the mathematical professors, among whom are such leaders in the educational world as Dr. Thomas Fisk and Prof. J. H. Van Amringe, head of the mathematical department. The late Prof. William G. Peck of Columbia, who made a big name in the college world by compiling that stupendous mathematical work, "Davies' Legendre," often consulted Mr. Carll.

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