

IN SEARCH OF ELWIN BRUNO CHRISTOFFEL; IS THIS FAMOUS MATHEMATICIAN NOT SO WELL-KNOWN?

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Abstract: While on vacation in Monschau (Germany) we suddenly stood in front of a commemorative plaque on behalf of the 150^{est} birthday of the famous mathematician Elwin Bruno Christoffel (1829-1900). The talk at the Mat@mium 2002 conference

presents an overview of his work and his influence and of the color locale of places where he used work and to teach. It will be embedded in the historical surroundings of the cities of Aachen, Monschau, Berlin, Zürich, and Straßburg. A survey of our investigations is due to appear in the column The Mathematical Tourist of the journal The Mathematical Intelligencer. The talk will be accompanied with lots of slides, photographs, and journal pages.

1 INTRODUCTION

The subtitle of this contribution seems to contain a contradiction. Indeed, is it possible that someone is famous whereas it looks as if that very same person is not so well known? Well, here we present a way to get rid of this riddle.

It appears that the mathematics of Elwin Bruno Christoffel (born 1829, Montjoie - deceased 1900, Straßburg) is well known, no doubt about that! Many of you, dear mathematically inclined readers, will be aware of the so-called Christoffel-Darboux-Einstein summation formulae, Christoffel symbols, or of the Christoffel-Schwarz mapping theorem. There is more, of course, much more. Among other things Christoffel's thirty-five printed papers deal with subjects like function theory including conformal mapping theory, propagation of electricity, Gaussian quadrature, continued fractions, dispersion of light, movements of points in periods, continuity conditions as to differential equations, minimal surfaces, theory of invariants, geodetic triangles, geometry and tensor analysis, orthogonal polynomials, shock waves, potential theory, Riemann's integrals, Jacobi's theta-sequences, irrational numbers, all yielding a beautiful lot of 19th century mathematics; here you should consult his Collected Papers (8).

There also exist contemplative contributions on the mathematical works of Christoffel. To start with, view (9) and (12), being about a century old. On the other hand, Christoffel as a person acting in his society and habitat, his social, mathematical and intellectual acquaintances in Berlin, Zürich and Straßburg (the places where he used to lecture) happened to be another story at our initial sight, i.e. without making use of the so-called electronic search-machines of today. But around the year 1981 it turned out already, that three elucidatory sources, other than (9) and (12) were in existence, as we discovered in 1999, in a rather surprising way.

2 A MEMORIAL

During a short holiday in the summer of that year 1999 in the neighborhood of the so-called "drielandenpunt" (meaning: the meeting point of the three countries The Netherlands, Belgium, Germany) both of us took a stroll through the colorful and picturesque city of Monschau (until 1918: Montjoie), where suddenly our attention was fixed upon a plaque on one of the walls of the building at the Rurstraße 1.

The inscription on it reads as follows:

Dr. Elwin Bruno
CHRISTOFFEL

Professor der Mathematik
in Zürich, Berlin, Straßburg
* 10.11.1829 in Monschau
+ 5. 3.1900 in Straßburg
GEBURTSHAUS

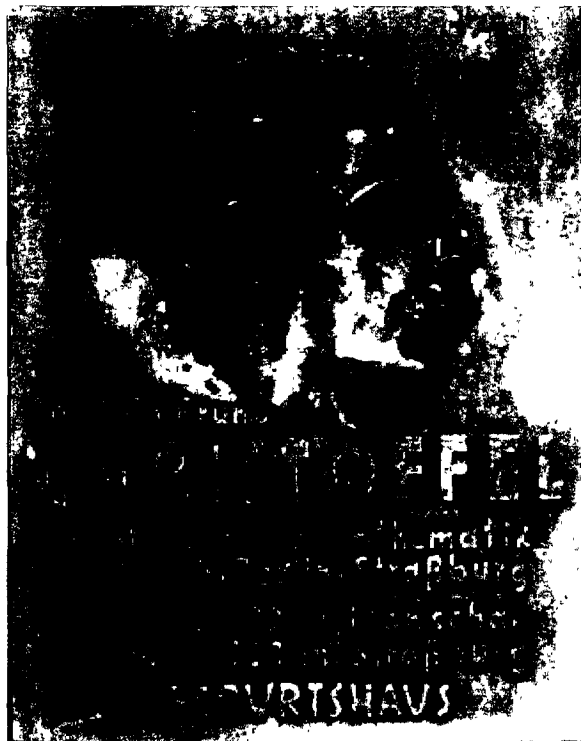


Figure 1. The memorial.

So here it is. It concerns the building in which Christoffel was born. More precisely, as we found out, the original home in which he was born, was burned down in 1835. The plaque contains a sculpture of his face en face too; it is derived from the only known photograph for which one is absolutely sure that it represents Christoffel (he is then about 40 years of age).



Figures 2-3. Left: the only known photograph representing Christoffel. Right: the (German) subscript in (6) to the second photograph indicates that it might be another picture of Christoffel, at older age, as physiognomy suggests.

Nowadays the building at the Rurstraße 1 comprises the Parfumerie-Foto-Drogerie "Servaes" at the bottom floor. Its proprietor Mrs. Ingrid Hermanns did tell us that the plaque has been unveiled in the year 1979 in commemoration of the 150th birthday of Christoffel. She also showed an invaluable item in connection to all aspects of life and work of Christoffel. It turned out to be a three-issues-in-one volume of a journal dealing with the local history of the city of Aachen and its surroundings; view (6). That source (not so well-known to mathematicians we presume) did trigger our investigations on Christoffel. We daresay, that the eighty pages of (6) are thoroughly filled with all sorts of profound and important information; as such it is an indispensable toolkit. It provides a lot of photographs (Lejeune-Dirichlet, Geiser, Prym, Rost, Hilbert, Riemann, Einstein, Weierstrass, Klein, von Laue, Reuleaux, Ricci-Curbastro to mention a few) besides a description of the social environment of Monschau and a genealogy of Christoffel, a history on his life and work, his school years in Cologne, mathematics and politics combined with intrigues in Zürich, Berlin and Straßburg. Of course, one finds there the list of all of his printed publications.



Figure 4. View from dormer window of the building at the Rurstraße 1, in 1889, at the place where Christoffel was born.

3. ADDITIONAL INFORMATION AND CONCLUSION

Be aware that in (6) all of the beautiful and clarifying material, presented over three columns per page and supplied with an enormous amount of (pragmatic) references, is brought to you in the German language. The reader not in command of the German language should not be discouraged, however. Our investigations revealed, indirectly from source (6), that a conference took place in Aachen and Monschau (both in Germany) in November 8-11 of the year 1979, on the influences and aspects of the work of Christoffel into our era. Much is to be learned from the twelve lectures given at the conference and from forty-five papers written on invitation; see (7). The beginning of (7) yields an English version of some of the papers presented in (6), be it in a form slightly more condensed in comparison to the ones in (6). It is nevertheless clear that the starting part of (7) provides a good impression of time and circumstances in which Christoffel used to work. An accurate, short but complete, overview of the contents of the conference is also to be found in the very handy non-mathematical source (1).

Above we have told our story how we did unveil Christoffel's life and work up to the year 1981. An electronic search-machine investigation provides relevant and additional material of later date (read up Christoffel's geometry in (11) for instance). The so-called "Riemann example" of a continuous non-differentiable function is scrutinized in dept in the remarkable paper (4). Furthermore one finds that mathematics used to be a vivid affair in the region of the "drielandenpunt" during the last 1200 years (view (3) and (5)),

whereas mathematics in Zürich and Berlin over the ages has been described in (10) (see the contributions of G. Frei and E. Knobloch therein, respectively).

In summary, it has come to light that an almost conclusive overview of life and work of Christoffel in his days and its impact into our days, has been described in (1), (3), (5), (6), (7) and (11), while its relevant mathematics is presented in the greater part of (7) and (of course) in (8). Besides that, modern electronic data comprise source (14) and above all, the unsurpassed source (13). Hundreds of papers have been published since 1980 in which Christoffel's mathematics plays the leading part.

All this being said, we hope to have convinced you, that the question brought up in the subtitle of this mathematical tourist contribution, has to be answered in the negative, i.e., Christoffel is famous and well known!



Figures 5-6. View on the house and the memorial plate, shown by the authors.

Acknowledgement

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