

# A Commemorative Plate for Wilhelm Killing and Karl Weierstraß

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*Does your hometown have any mathematical tourists attractions such as statues, plaques, graves, the café where the famous conjecture was made, the desk where the famous initials are scratched, birthplaces, houses, or memorials? Have you encountered a mathematical sight on your travels? If so, we invite you to submit an essay to this column. Be sure to include a picture, a description of its mathematical significance, and either a map or directions so that others may follow in your tracks.*

► Please send all submissions to  
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A search for “The Greatest Mathematical Paper of All Time” on Google, MathSciNet, or “Zentralblatt für Mathematik” unvaryingly leads to the work of Wilhelm Killing (1847–1923). His classification of simple Lie algebras over the complex numbers is a favorite keyword as well. Killing discovered them while a professor at the Lyceum Hosianum in Braniewo, Poland. In the 19th century, Braunsberg or Braniewo belonged to East Prussia, in Germany, but it became a Polish city after the Second World War, and thus its name changed.

## The “Greatest Mathematical Author” and His Mentor

Killing published four consecutive papers in the *Mathematische Annalen*, in a time span of two years, from 1888 to 1890. He entitled them “Die Zusammensetzung der stetigen endlichen Transformationsgruppen”. The papers were the reason for A. J. Coleman’s biographic article [1] in *The Mathematical Intelligencer*, written on the occasion of the centennial anniversary of their publication. Coleman’s admiration for Killing’s work was supported by others, such as Jean Dieudonné, in a review of Coleman’s article in *Mathematical Reviews* [3]. Dieudonné even added “Killing’s result became a most important milestone in modern mathematics”.

The history of mathematics of the last century shows Killing’s classification result has been revisited, revised, simplified, and extended into broader and different areas by eminent mathematicians, such as E. Cartan (1894), H. Weyl (1925), B. L. van der Waerden (1933), H. S. M. Coxeter (1934), E. Witt (1941), E. Stiefel (1942), E. D. Dynkin (1947), C. Chevalley (1955, 1961 ff.), J. Tits (1966 ff.), V. G. Kac and R. V. Moody (1968), F. Bruhat (1972 ff.), just to mention but a few. A detailed description of the history of Killing’s classification, including bibliographic remarks, is provided in [9].

Killing’s influence is still present in current common mathematical expressions, such as “characteristic equation of a matrix” (“charakteristische Gleichung” in German, cf. [6] II, p. 2), or “semi-simple group” (“halbeinfach” in German, [6], III, p. 74). He introduced the latter as follows:

*Solange ein besserer Name fehlt, möge es gestattet sein, eine solche (Gruppe) als eine halbeinfache zu bezeichnen.*

That is:

*As long as a better name is lacking, it might be permissible to denote such a group as semi-simple.*

Apparently, a better name never came up.

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Map of Poland.

Killing was a student of Karl Weierstraß, in Berlin, where he got his PhD in 1872. He worked as a high-school professor at various places for several years, simultaneously writing several publications on geometric subjects. Finally, Weierstraß's recommendation led to an appointment for a chair of mathematics at the "Lyceum Hosianum", where his advisor Weierstraß had held a teaching position himself from 1848 until 1856. Killing would teach there for ten years, from 1882 to 1892. A detailed biographical description of both Killing's and Weierstraß's life is provided in [8] and [4]; see also [5] and [7].

### The Memorial Plate

In November 1996, the first author gave a lecture on "Linear algebraic groups and related structures" at the University of Bielefeld, and he mentioned Coleman's paper [1]. The

second author of the current article, who teaches at the Gdańsk University, was surprised to learn that Wilhelm Killing had been a professor at Braunsberg, located 110 kilometers east of Gdańsk. The Institute of Mathematics of the University of Gdańsk then organized a workshop at Braniewo entitled "The Second Days of Hyperbolic Geometry, in memoriam of Wilhelm Killing" from August 31 to September 2, 1998. Coleman wrote an address entitled "Killing in Braniewo"; see [2].

At that time, the authors realized Weierstraß had been a school teacher too in Braniewo, from 1848 to 1856. During this workshop, the idea of a memorial plate in honor of Killing and Weierstraß was born. Its realization took 10 years, because of lack of financial support and difficulties to obtain all kinds of permissions. The ceremony of unveiling the commemorating plate took place on July 24–25, 2008. It was organized by the Institute of Mathematics of the University of Gdańsk and Braniewo's local



Images of the ceremony (right: J. Elstrodt during his ceremonial address).



The Memorial Plate.

government. The plate shows a simple text, in German and in Polish, with the information explaining that Killing and Weierstraß were teachers in Braniewo. It is signed by the Polish Mathematical Society and the Deutsche Mathematiker-Vereinigung [10]. The rectors of the University of Gdańsk and of the University of Warmia and Mazury in Olsztyn belonged to the honorary Committee.

The ceremony began with a Mass in memory of Killing and Weierstraß, celebrated by the bishop Jacek Jezierski. Then the group of about 60 participants went to the former Lyceum Hosianum to unveil the plate. Prof. Falko Lorenz

(Department of Mathematics, University of Münster) informed the authors that this actually is the front of the former Catholic Gymnasium as there is nothing left of the buildings of the former Lyceum Hosianum. After the mandatory official speeches, L. Dziąg and A. Szczepański unveiled the plate and the bishop gave it his benediction. A memorial colloquium was held, including lectures about the life of Killing, by F. Lorenz (University of Münster), and about the life of Weierstraß, by J. Elstrodt (University of Münster). The involvement of Münster is not surprising, because Killing held a position at the University of Münster

and also because the cities of Braniewo and Münster are related by a European city partnership. This historical part was followed by more mathematically inclined lectures, by F. Knopf (University of Erlangen), T. Januszkiewicz (University of Ohio and University of Wrocław), F. E. A. Johnson (University College of London), and W. Soergel (University of Freiburg). Finally, in the evening of the first day, a concert and a party sponsored by the mayor of the city Braniewo festively concluded the event.

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