The Home of Golden Numberism

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Does your hometown have any mathematical tourist 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 to this column a picture, a description of its mathematical significance, and either a map or directions so that others may follow in your tracks.

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The expression "golden numberism" refers to the set of claims concerning the purported use of the golden number (division in extreme ratio, golden section, golden ratio, . . .) in man-made objects (art, architecture, etc.) or its purported appearance in nature (human body, plants, astronomy, etc.). If we leave aside the vague statements by Kepler, the early nineteenth-century association of the golden number with phyllotaxis, and a few other extremely obscure comments, then we can state that the beginning of golden numberism is due to one person, the German intellectual Adolph Zeising (1810–1876).

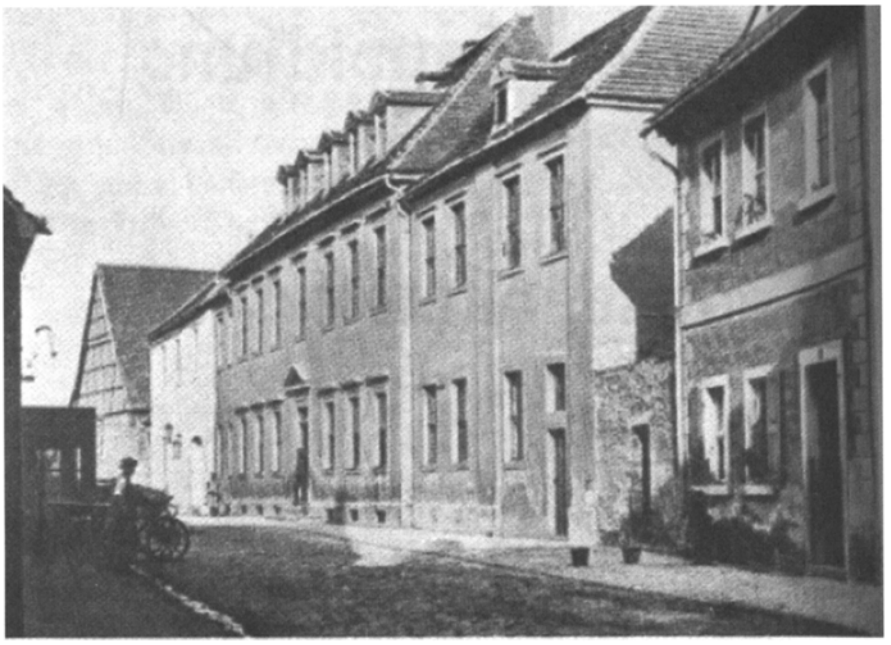
What is of particular interest to the mathematical tourist is that the origin of golden numberism is associated with a particular time and place. Zeising's father was a court musician in the tiny dukedom of Anhalt-Bernburg. This dukedom, as well as the other Anhalts—the various pieces of which will bring joy to any map colourist or topologist interested in non-connected surfaces—were contained in what is now the German *Land* of Sachsen-Anhalt. Because of his father's occupation, Zeising was born in Ballenstedt, the location of the summer palace, but a visit there made it clear that he is now completely unknown to local officialdom.

Where Zeising is known to some extent—though not in connection with the golden number—is in the city of Bernburg, which is some 75 kilometres northwest of Leipzig. Despite the ravages caused by events of the last sixty years, Bernburg, situated on the Saale river, remains a charming city. There are two edifices in Bernburg that should probably be jointly designated as the birthplace of golden numberism. The first is the building formerly occupied by the *Karls-Gymnasium*. In 1842, after having completed a doctorate with a specialty in Hegelian philosophy, Zeising became a full-time professor at that institution, and it was while he taught there that a combination of readings in philosophy and other fields inspired him to think of the golden number as an inherent rule of nature.

The other building of interest is the Bernburg castle. Zeising was a leader of the liberal left during the German revolution of 1848–1849, and he was elected to the first *Landtag*, which met in the castle. Perhaps Zeising thought about the golden number during some long-winded speeches, but more importantly, the castle represented political power. By 1851 the power was firmly in the hands of a very reactionary group, and Zeising was pensioned off in December 1852. Using this money he went to Leipzig to do further research, and in 1854 he published his book, *An Exposition of a New Theory of the Proportions of the Human Body, Based on a Previously Unrecognized Fundamental Morphological Law which Permeates all of Nature and Art, Together with a Complete Comparative Overview of Previous Systems.*

In the period from 1855 to 1858 Zeising continued to publish articles and a booklet dealing with the golden number. Some of these were of a popular nature, in particular his articles "Humans and Leaves" and "Face Angles," which were published in the widely read science magazine *Die Natur*. His book and these articles ensured that his theory became widely known, and by the time of his death in 1876 golden numberism was widespread in Germany. Philosophers debated the foundations of his theory, and authors suggested the use of the golden number in such fields as typography and fashion. The polymath Gustave Fechner, inspired by Zeising's claims concerning the *Sistine Madonna*, started scientific investigations, which in turn laid the foundations of the field of experimental aesthetics.

By the end of 1855 Zeising had moved to Munich, where he became



Bernburger Karlsgymnasium in der Junkergasse
1841 — 1882

Fig. 1. The Karls-Gymnasium, Bernburg, Germany.

active in literary circles and wrote novels and plays. He also wrote on philosophy—his 1855 *Aesthetics*, which presented an overview of the systems of Hegel and his followers, was very highly regarded—and politics. After a hiatus of ten years Zeising again wrote on the golden number, but, aside from an article on the Cologne Cathedral, these works were of a cultural or philosophical nature. A particular honour came in 1856: his admission to the Deutsche Akademie der Naturforscher.

There have been many interesting twists and turns in the development of the myth of golden numberism. Thus the association of the golden number with virtually all the pyramids of Egypt *except* the Great Pyramid was made by Friedrich Röber in 1855, independent of Zeising. On the other hand the first example of golden numberism in English dates from 1866 and deals with the golden number and the Great Pyramid—but in a manner not equivalent to that of Röber—and again this was independent of Zeising's writings.

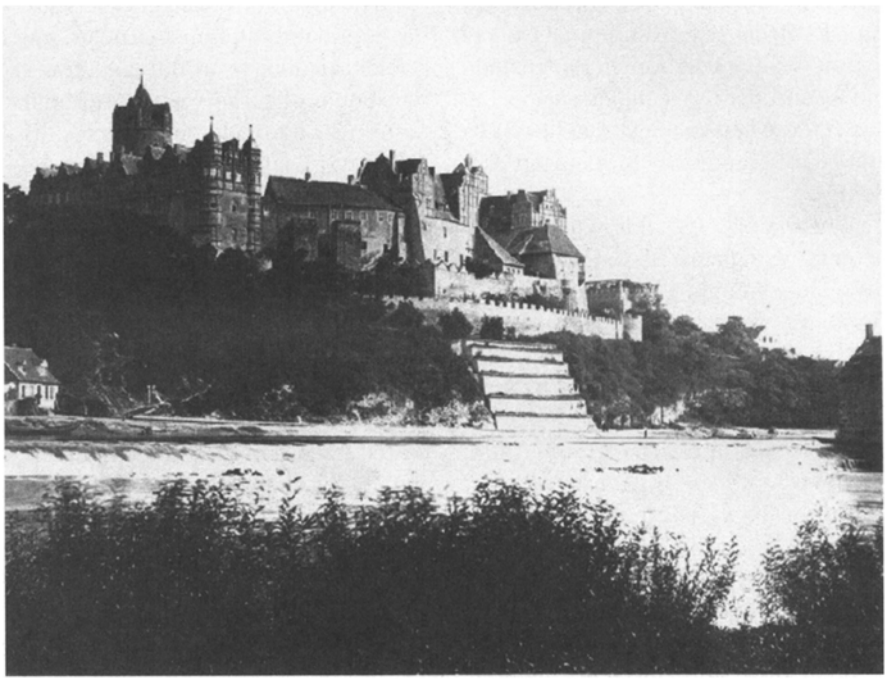


Fig. 2. Bernburg Castle.

After having entered France and the English-speaking world from Germany in the early part of the twentieth century, golden numberism spread rapidly. By a careful examination of sources, it is possible to trace the path travelled by the golden number myth. Aside from the topics of phyllotaxis and the Great Pyramid, virtually everything that has been written on the subject can ultimately be traced back to the influence of Zeising. The next time the reader hears another "historical" claim concerning the golden number he or she might care to glance at the accompanying photographs of the *Gymnasium* and the Bernburg castle, and remember where the myth started.

I consider Zeising the most intellectual of authors on the subject of the golden number. Unlike others, he attempted to present a true foundation—in his case philosophical—for his arguments. Not that I find him convincing! I am fascinated by the "sociology of mathematical myths" and the history of ideas. Thus my most recent work, *Adolph Zeising*, started out as a few paragraphs and then an appendix to my forthcoming book *The Golden Number*. In *Adolph Zeising* I trace the spread of golden numberism from Nees von Essenbeck in 1852 through 1876, the year of Zeising's death. *The Golden Number* will present a complete discussion of golden numberism, including the historical, sociological, and philosophical aspects. Parts of the story can be found in my other writings listed below.

Biographical Notes

Ebersbach's book discusses the period (1835–1852) when Zeising lived in Bernburg. In particular, there are sev-

eral references to Zeising's role in the 1848–1849 revolution. The photographs (1864 for the castle and the early part of the twentieth century for the *Gymnasium*) were taken from [Erfurth, p. 63] and [Schulgemeinschaft Carolinum und Friederiken-Lyzeum, p. 142] respectively. These photographs are reproduced with the kind permission of the Mittledeutsche Verlag (Halle).

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