

The Hornstein Impact

Bio-hazard in the traces
Stephan's findings of life

Depiction of a paleo-astronomical event

Findings of biological, geological and historical

Evidence in Weimar.

A mobile exhibition by COSMI in cooperation with ACC on cellular phones

Meteor impacts: Life's jump starter.

"Hydrothermal systems are ...the favourable places for life to evolve."



The 4-5-km diameter Hornstein impact structure is located in Germany roughly 0.5 km east of the center of Weimar. From stratigraphic considerations, its age is estimated to be Oligocene or Upper Paleocene. Except for some intrusions, the target was bedrock.

The crater is not visible on the surface due to natural and man-made erosion.



In the West and North the rim is almost marked by the railroad. The eastern arc is destroyed by the “Weimar distortion” and the breakthroughs of the Ilm. Only to the Southeast the landscape resembles some rim-like structures of secondary nature.

The impact structure is located in the middle of the Weimar-distortation, a significant interruption of the larger

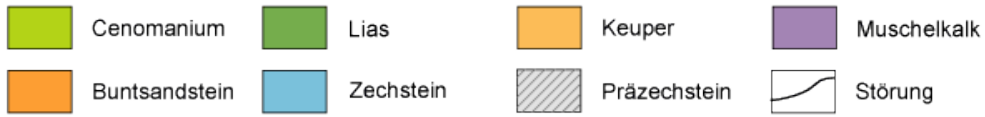
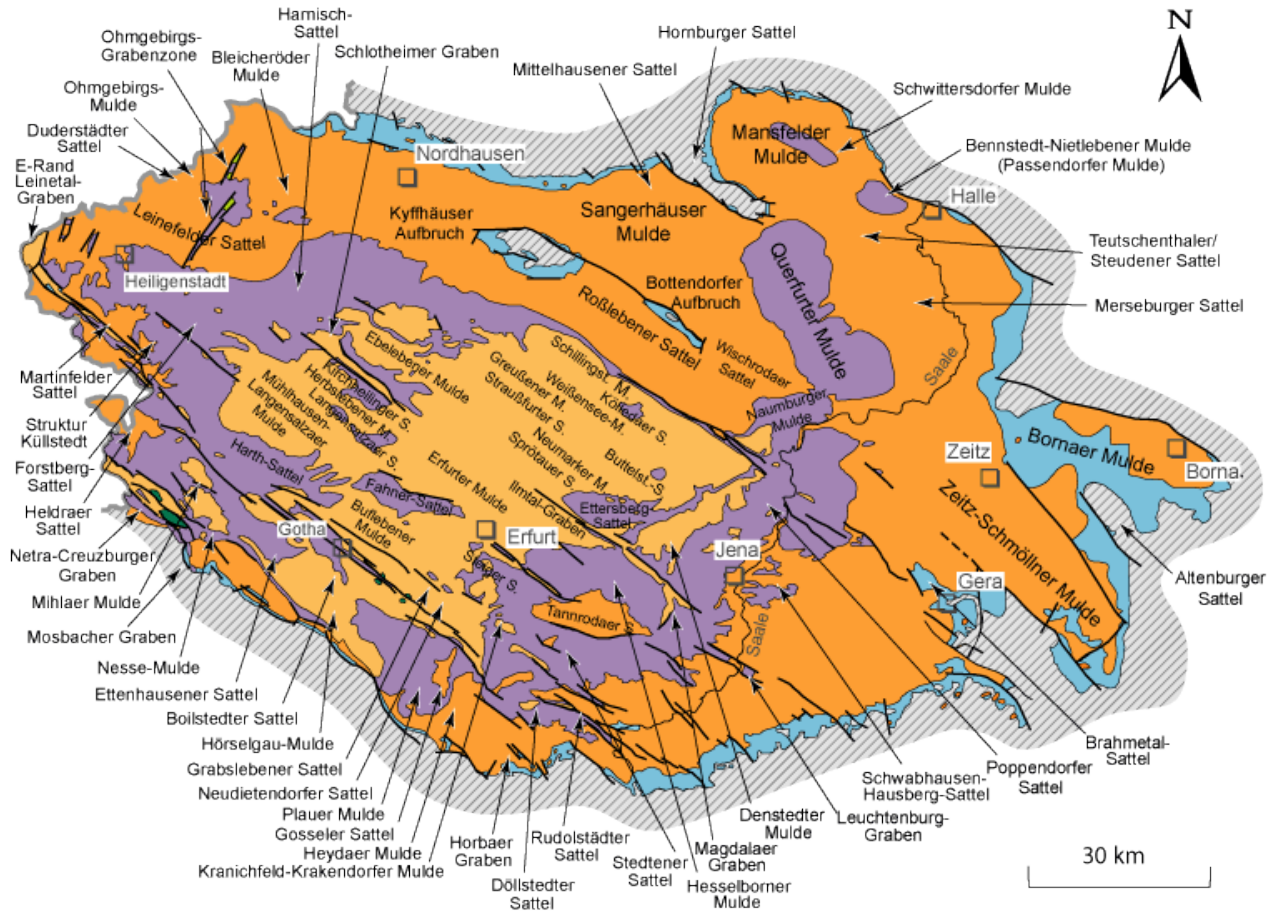
Schlotheim-Leuchtenburg-distortion marked the Ettersberg-saddle, the highest elevation inside the Thuringian basin.

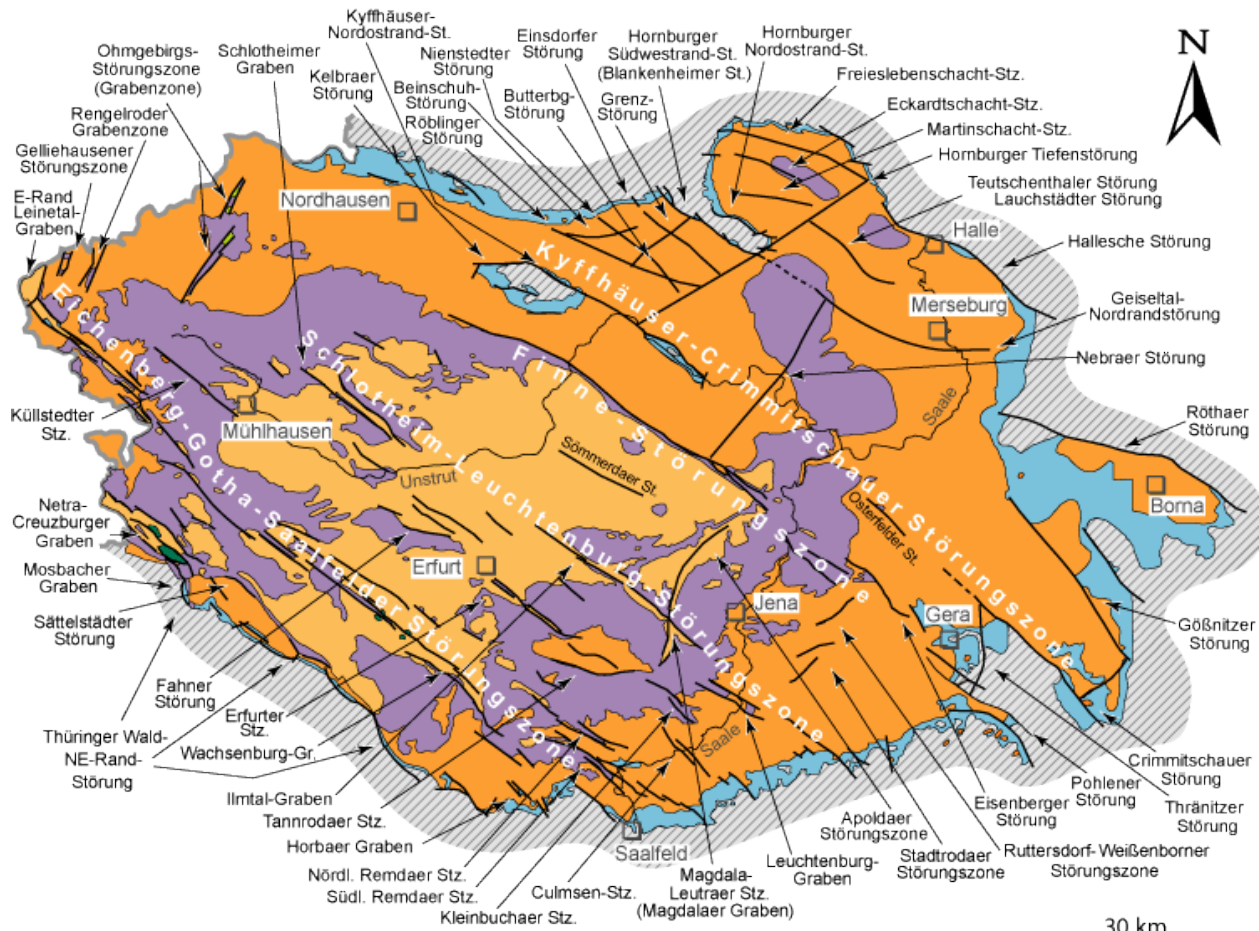


The Hornstein impact shares the same history as many other impact structures. The unusual nature of the Weimar-basin is simply “structurally disturbed” and the area named as “Weimarer Störung”. The cause of the distortion remained unattended. Unusual rocks in the area were reported as early as 1756 and at that time considered either

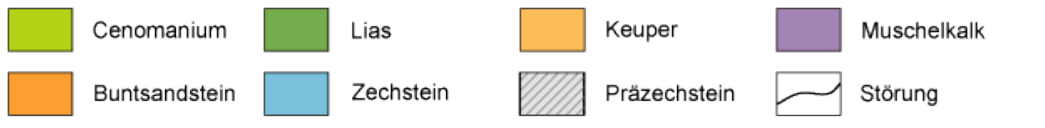
volcanic rocks or man-made products. Since then, some few found impactites are regarded as volcanic rocks or tectonic breccias.

The SIRP (Small Impact Research Project) was founded to locate and identify small impact structures, amongst them the Hornstein-impact.





30 km



The Hornstein Impact

Description of a paleo-astronomical Event

Findings of geological and historical Evidence
in Weimar

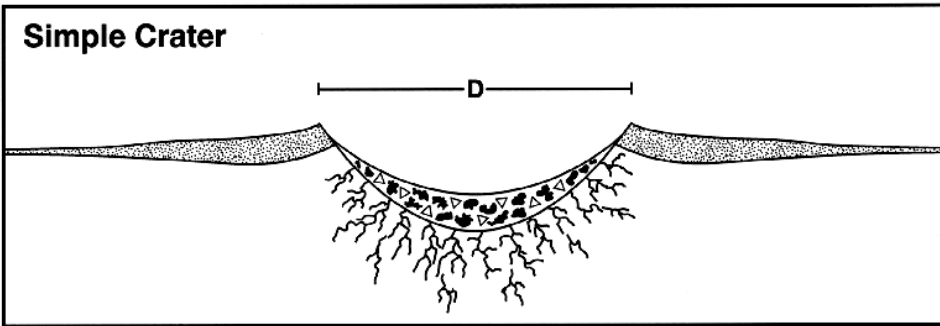
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Craters are the most common topographic form on planetary surfaces
in the inner part of the solar system.

Elbert A. King, Jr. (1976)

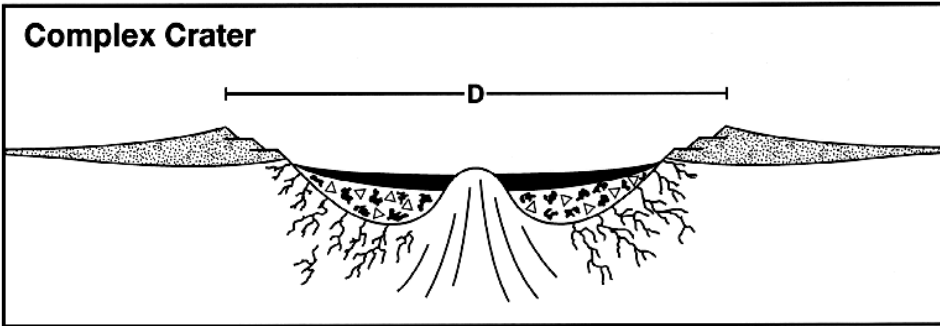


Simple Crater



-  Breccia
-  Impact melt
-  Impact ejecta
-  Fractured bedrock
-  Central peak uplift

Complex Crater





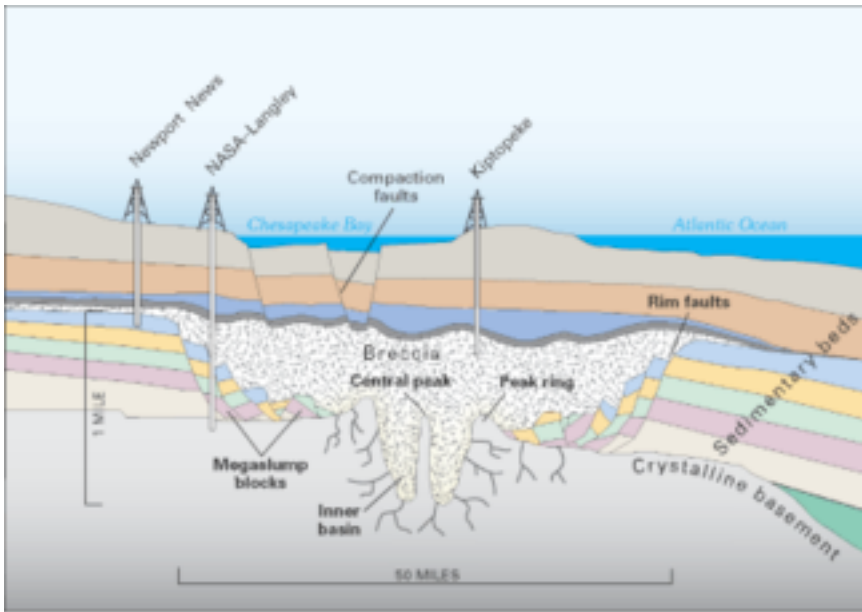
Understanding the Impact Cratering Process: a Simple Approach

We are sure, every girl and boy, and many also in adulthood have sometime thrown pebbles and cobbles into mud, and they saw nice little craters with a rimmed wall and ejected mud around had been formed (Fig. 1). Later, when they saw images of the famous bowl-shaped Barringer meteorite crater in Arizona (Fig. 2) they might have thought both had been formed by the same mechanism.



Geological sketch map of the Azuara Hornstein impact structure.

- 1 = Paleozoic,
- 2 = Mesozoic,
- 3 = Pelarda Fm. ejecta,
- 4 = Cenozoic.



Until 1993, no one suspected the existence of such a crater buried 70-150 meters beneath the lower part of the Weimar basin. The first hint was a 2 centimeter-thick layer of ejecta that turned up in a drilling core taken off Atlantic City, New Jersey, far to the north. The layer contained the fused glass beads called tektites and shocked quartz grains that are unmistakable signs of a bolide impact.

The Hornstein Impact

Description of a paleo-astronomical Event

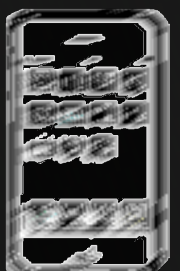


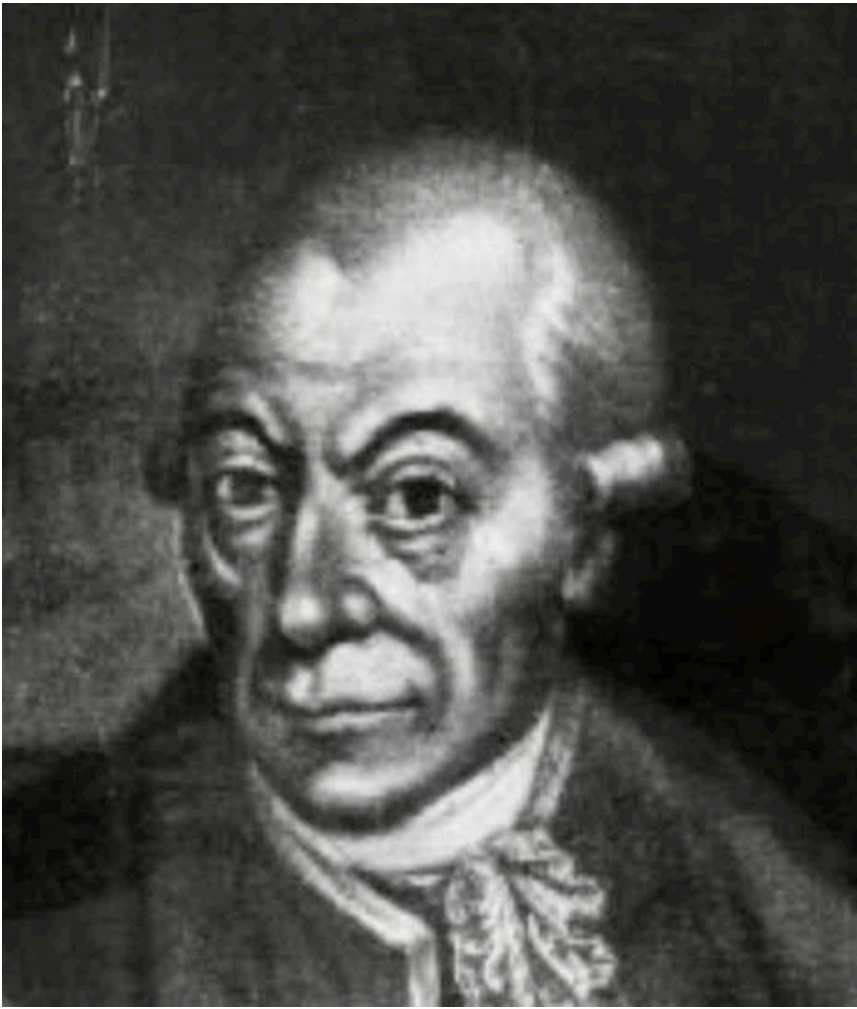
What holds the world
together in its
innermost

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Nathanael Matthaeus von Wolf

January 28, 1724 -
December 15, 1784

German scientist, physician and astronomer.

Wolf, who studied medicine at the University of Erfurt, is believed to be the first one who noticed the peculiarities of the landscape around the Hornstein. Thus the anomaly and the impact structure is named thereafter.



Ernst Florens Friedrich
Chladni
November 30, 1756 -
April 3, 1827

German physicist and musician. His important works include research on vibrating plates and the calculation of the speed of sound for different gases. He also did pioneering work in the study of meteorites, and therefore is regarded by some as the "Father of Meteoritics".

“Doctor Chladni has arrived and has brought his complete Acoustics in a quarto volume. I have already read half of it and shall give you a somewhat agreeable oral report on its content, substance, method, and form. He belongs to . . . those blissful persons who have not the faintest idea that there is something as natural philosophy and who are only attentively trying to observe phenomena which they will then classify and make use of them as well as their natural talent is capable in the matter and is trained for the matter.”

The Author (Goethe) had no idea about the nature of science in its modern sense.

“Doktor Chladni ist angekommen und hat seine ausgearbeitete Akustik in einem Quartband mitgebracht. Ich habe sie schon zur Hälfte gelesen und werde Ihnen darüber mündlich, über Inhalt, Gehalt, Methode und Form manches Erfreuliche sagen können. Er gehört . . . unter die Glückseligen, welche auch nicht eine Ahnung haben, daß es eine Naturphilosophie gibt, und die nur, mit Aufmerksamkeit, suchen die Phänomene gewahr zu werden, um sie nachher so gut zu ordnen und zu nutzen, als es nur gehen will und als ihr angebournes, in der Sache und zur Sache geübtes Talent vermag.”



Abraham Gottlob Werner
September 25, 1749 - June 30, 1817

German geologist who set out a now obsolete theory about the stratification of the Earth's crust and coined the now obsolete word Neptunism.

Werner was the first to describe Prehnite in 1789 for occurrences in Germany, and named for Colonel Hendrik on Prehn (1733-1785), commander of the military forces of the Dutch colony at the Cape of Good Hope from 1768 to 1780, who provided samples from there.

As follower of the Neptunism he denied that Prehnite was of volcanic origin.

The existence of impact structures did not come to his mind.



Johann Karl Wilhelm von
Voigt

February 20, 1752 -
January 1, 1821

German geologist who set out
a now obsolete theory about
the stratification of the
Earth's crust and joined the
now obsolete word

Plutonism is the geologic theory proposed by James Hutton around the turn of the 18th century that volcanic activity was the source of rocks on the surface of the Earth with forms we see today only arising after erosion or other gradual processes. It was named for Pluto, the ancient Roman god of the underworld. This replaced Abraham Werner's Neptunism theory, which claimed that rocks had originated from a great flood and were basically sedimentary in origin.

Due to the influence of his brother, a member of the secret council in Weimar, Voigt was set aside to Ilmenau as mining official.

There he discovered some remarkable, especially some rare evidence of the ejecta of the Hornstein impact, but did not come to the right conclusion.

The Hornstein Impact

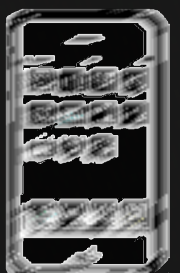
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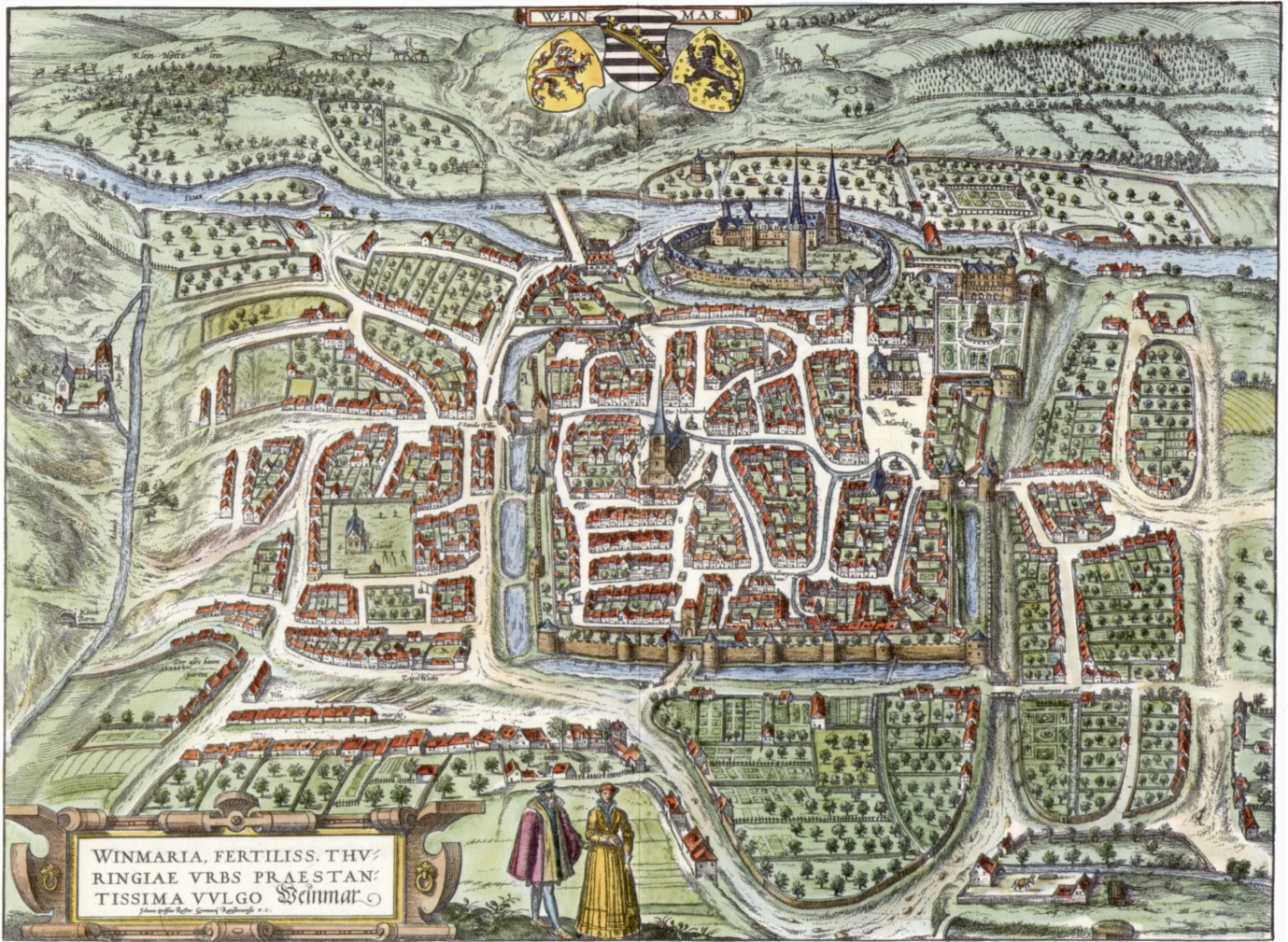
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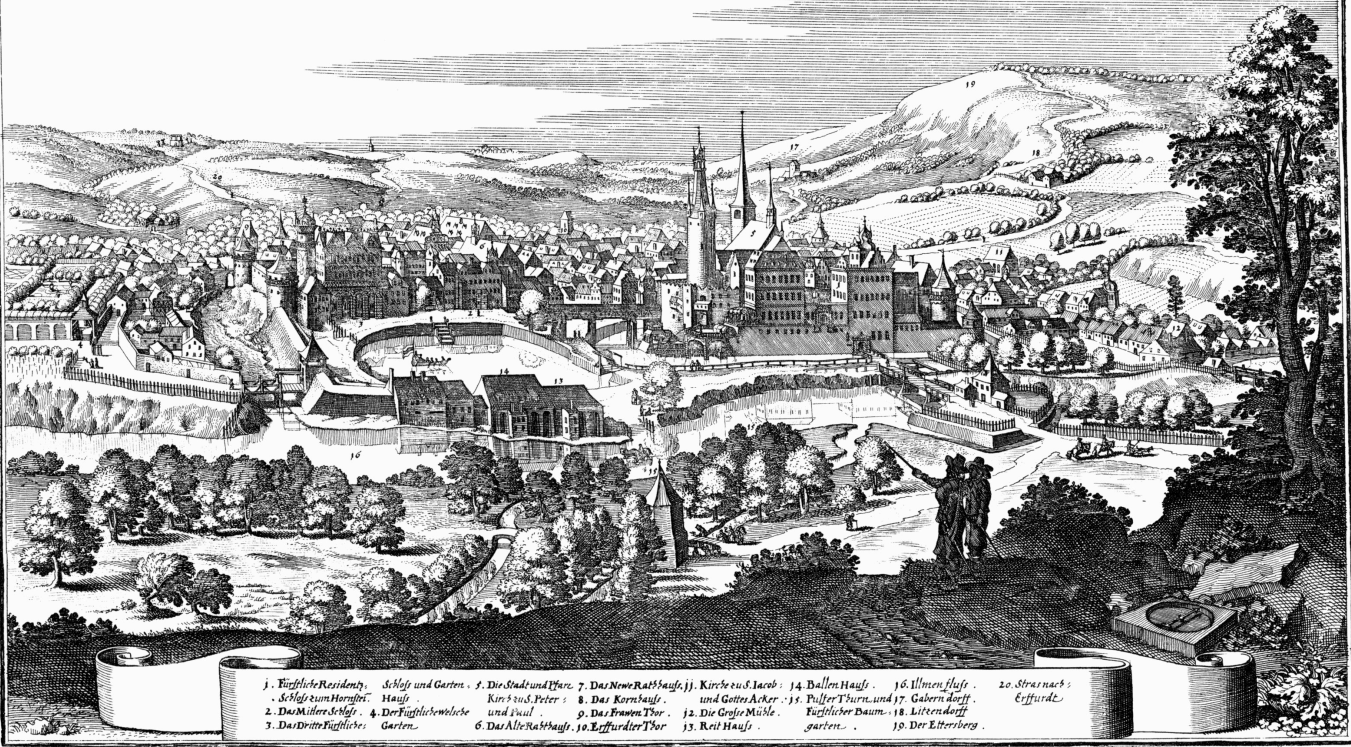
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WINMARIA, FERTILISS. THV/
RINGIAE VRBS PRAESTAN/
TISSIMA VVLGO *Winmar*

Fürstliche Residentz Stadt Weimar .



- | | | | | | | | |
|----------------------------|---------------------------|--------------------------|-------------------------|--------------------------|--|------------------|----------------|
| 1. Fürstliche Residentz . | Schlöß und Garten . | 5. Die Stadt und Thore . | 7. Das Neue Rathshaus . | 11. Kirche zu S. Jacob . | 14. Ballen Hauff . | 16. Ulmenfluff . | 20. Strannachs |
| 2. Das Mittlere Schlöß . | 4. Der Fürstlichen weiche | 6. Das Alte Rathshaus . | 10. Efffurter Thor . | 13. Reit Hauff . | 15. Pulver Thurm und 17. Galern Hoff . | 18. Littensteuff | Erffurde |
| 3. Das Dritte Fürstliche . | Garten . | 8. Das Kirchshaus . | 9. Das Frauen Thor . | 12. Die Große Mühle . | 19. Fürstlicher Baum . | | |

PLAN von der Fürflich-Sächfifchen Refidenz Stadt WEIMAR, aufgenomien von F. L. Guffefeld, und zu finden bey denen Homgnifchen Erben in Nürnberg, 1784. Mit Kaiserl. Mayest. Privilegio.

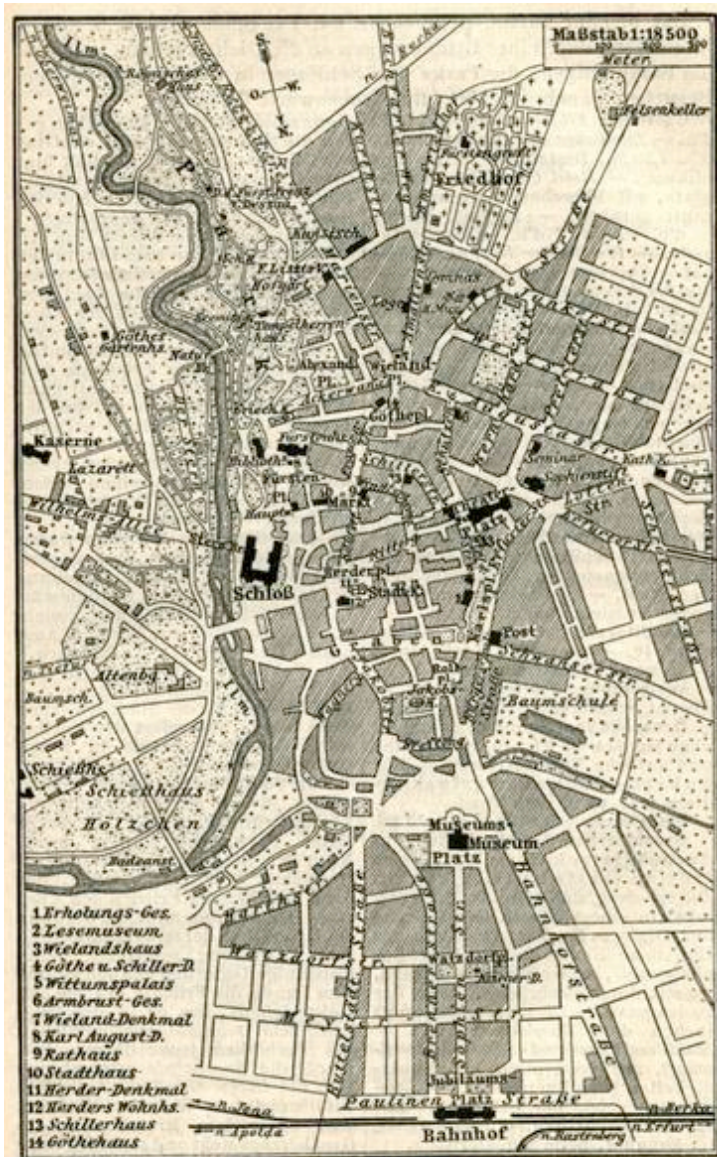
PLAN von der Fürflich-Sächfifchen Refidenz Stadt WEIMAR, gemessen im Jahr 1782.

- | | | | | |
|--------------------------------------|--------------------------|----------------------|--|---|
| I. Frey öffentl. und privat. Gebäude | 3. In der Laube Vorstadt | 36. Frauen Plan | Offentl. auch einige privat Brauereyen | Wasferleitung |
| A. Das Schloß | 4. Sächf. Kirche | 37. Form Frauen Thor | 80. Vopanus | Die Luff wird bey der gebauet das wilder Wasser durch die Schenken einen Thon kugelformig laufft vor sich den werten ka zu 100 bis 110 in 3 Thon gebauet deren der oben 10. 12. durch die Strassen und die breite laufft lauffen den, welcher ferner auf die Stummühle, fließt. Von 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. |



Das Maßstab von 60 Weimar's Ruthen

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Plan von Weimar.