FISHBOURNE HYPOCAUST

HEATING HISTORY

THE HYPOCAUST
PART ONE

BRIAN ROBERTS
Hollow bricks lead warm air, and store and radiate heat.

Warm surfaces create a comfortable indoor climate.

Thermal up-draft powers air movement through the system.

An elevated structure underneath the floor helps to distribute hot air.
THE HYPOCAUST
PART ONE

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THE HYPOCAUST HEATING SYSTEM

The Hypocaust is a system providing central heating in a building. It works by heating the air in a solid-fuel furnace and circulating this warm air below the floor of the room or bath. One reference suggests that the Greek Temple at Ephesus was heated in this way in around 350 BC, but the Roman writer Vitruvius attributes the invention of the hypocaust to Sergius Orata around 80 BC.

The Roman furnace, or stoke hole, was fed with wood as fuel by a slave or attendant. Hot air and smoke from the furnace would circulate through this below-floor space, the hypocaust, the ceiling of which was raised above the ground by pillars (pilae stacks). These supported a layer of tiles, followed by a layer of concrete, then the floor tiles of the rooms above. Hot air and smoke from the furnace would circulate through this enclosed space and then up through clay or tile flues in the walls of the rooms above to outlets in the roof. This arrangement could also be used to warm upper rooms. Rooms intended to be the warmest were located nearest to the furnace below.

Heat output was regulated by adjusting the quantity of wood fed to the fire. This was a labour-intensive and time-consuming operation, requiring constant attention and large amounts of wood as fuel, making the hypocaust found only in public baths and large villas.

The remains of numerous Roman hypocausts have been found throughout England, continental Europe and as far afield as northern Africa and western Asia. After the decline of the Roman Empire, various forms of hypocaust were developed and survived for many centuries.

Remains of a hypocaust at Lincoln.
HYPOCAUST WALL FLUES
Hypocaust found 1701 at Wroxeter, *Philosophical Trans Royal Society* Vol.25, 1706

Hypocaust at Hovingham in 1745, *British Museum*
LINCOLN & NETHERBY HYPOCAUSTS

Lincoln 1739, Phil Trans Vol.41

Netherby, Cumberland 1745, Phil Trans Vol.53, 1763
STOVES & VILLA ALLE FRATTOCCHIE

Old stoves, J J Winckelmann, Works 1832-34

Villa alle Frattocchie, Piranesi 1764
Caerleon

Roman bath, Welwyn
3.1.4 The hypocaust

The hypocaust was devised by the Romans, and used for some centuries from about 80 B.C. to the end of the Roman Empire in 450 A.D. in the villas throughout Europe and Britain. In the Roman motherland, it was used almost exclusively for heating baths, and in a few large houses. Only after the destruction of Pompeii in 79 A.D. did the hypocaust begin to oust the brazier as a means of room heating. Some excellent examples are to be seen in Britain at Chester, Bath and Chedworth (Glos.), the last of these being perhaps the finest. Here the boiler was believed to have been made from thick sheet lead, supported on massive iron bars. In Europe, the castle at Saalburg and the baths at Trier are well preserved (Fig. 3.1). The hypocaust is said by Kretzschmer to have been devised by C. Sergius Orata in about 80 B.C.; it was described by Vitruvius in his book De architectura in 16 B.C. (56)

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Fig. 3.1. Hypocaust at Saalburg.
ROMAN BATHS HYPOCAUST IN BATH
BILLINGSGATE & JEWRY WALL LEICESTER
HYPOCAUST AT JEWRY WALL LEICESTER
HYPOCAUST AT JEWRY WALL LEICESTER
CHEDWORTH VILLA HYPOCAUST
CHEDWORTH VILLA HYPOCAUST
Chester Hypocaust

On View

Roman Bath

Hypocaust

Which is in a perfect state of preservation and in its original situation.

The bath was built about the end of the First Century and is therefore over 1,800 years old.
The ruins of the Exeter Roman Baths are not currently visible being buried just below the surface of Cathedral Green in front the West Facade of the Cathedral. The Bath House is believed to date from about 60 AD and contained hot, warm and cold baths with a large furnace house and hypocaust system. It was discovered over fifty years ago by workmen digging foundations for a new development.

A large-scale archaeological excavation was carried out in the early 1970's, but funding became an issue and the parties involved at the time were uncertain over what to do. So the decision was made to cover the Roman Bath House back over. Plans to uncover the Bath were considered in 2014-15. Funding was again rejected so the Baths remains buried.
ROMAN BATHS HYPOCAUST AT EXETER
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ROMAN BATHS AT EXETER
HYPOCAUST AT LINCOLN
FRANCE- HYPOCAUST AT ARLES
ISRAEL- HYPOCAUST AT BETH SHEAN
ISRAEL- HYPOCAUST AT CAESAREA
LEBANON- HYPOCAUST IN BEIRUT
LIBYA- HYPOCAUST AT LEPTIS MAGNA
LIBYA- HYPOCAUST AT LEPTIS MAGNA
TURKEY- HYPOCAUST IN ANKARA

THE HYPOCAUST

REFERENCES AND FURTHER READING

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The American Society of Heating, Refrigerating and Air Conditioning Engineers, Atlanta, GA.
2013 La Scoperta Dell'Acqua Calda (The Discovery of Hot Water), Carlo Manfredi, Maggiola Editore, Milan.
2022 The Hypocaust (Heat Storage): Part Two, Brian Roberts (E-Book), CIBSE Heritage Group website.

See CIBSE Heritage Group website: E-Books General/Systems & Equipment/Hypocaust Heating*
* Contains large text abstracts of many of the books listed above.

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