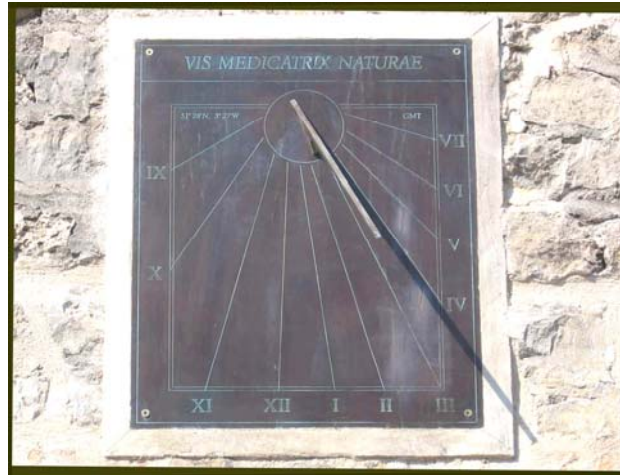


## INFORMATION NOTES

### SUNDIALS



#### What does a sundial do?

It measures time by the position of the sun: as the position of the sun changes so the time indicated by the shadow changes.

#### How long have sundials been around?

A sundial is perhaps the most ancient of all scientific instruments and is the earliest known form of time keeping. The first sundials probably developed when men and women noticed the lengthening and shortening of their own shadows. Stonehenge is not a true sundial because it was used to mark the season and not the hour. The oldest known true sundial was constructed in Egypt around 1500 BC. The Romans later perfected sundials and were the first to use them in gardens. In the medieval and Renaissance periods, elaborate ornate sundials appeared: the town of Nuremberg was especially famous for its elegant designs. Few of the cheaper wooden versions of sundials have survived. It wasn't until the 18<sup>th</sup> century that John Harrison, a Yorkshire carpenter and amateur watchmaker, managed to produce a chronometer which was accurate enough to find longitude anywhere at sea. Until this event sundials and clocks flourished side by side but since Harrison's discovery clocks have become predominant although it is rumoured that the railways of France were regulated by sundials until the beginning of the 20<sup>th</sup> century.

#### How does a sundial work?

A sundial can either be fixed or portable and can be mounted on the ground or on a wall, as in the Cowbridge Physic Garden. The sun casts a shadow from the **gnomon** (the part of the sundial which casts a shadow) on hour lines. Sundial time is termed 'apparent solar time' and differs from clock time by an amount known as the 'equation of time'.

## INFORMATION NOTES

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The sun varies in its timekeeping throughout the year, sometimes losing and sometimes gaining. This differentiation is caused partly by the varying speed at which the earth

travels in its path around the sun and partly by the tilt of the earth of  $23.5^\circ$  to the plane of its orbit. Clock time is a convenient but artificial 'mean' of the two variants, normally based on a standard time zone: Greenwich Mean Time (GMT) in the UK. Sundial time is local meantime and the difference in longitude between the meridian on which the sundial is situated and the meridian on which standard time is based must be applied to obtain standard time in the UK (GMT). All directional sundials must be carefully aligned in order to function accurately. Not until the 1<sup>st</sup> century AD was it demonstrated that a gnomon set parallel to the earth's axis would cast a shadow in the same direction at the same time every day of the year.

### **Why do you see sundials on old churches?**

The Christian church kept a strict system of its own to mark regular times of prayer at three-hourly intervals, known as canonical hours: the figures 3, 6 and 9 are of special significance on Anglo-Saxon and Celtic sundials. These times were often marked with a cross. 'Mass dials' (basic sundials scratched or engraved on to the south-facing stonework of a church) date from medieval times (1100-1600 AD) and were far from accurate. They used a horizontal gnomon, often a wooden pole pushed into a hole in the wall. This arrangement would be satisfactory near the equator, but is not so good in northern Europe. Mass dials are found on the south walls of churches, usually near the main door or the priest's door. Rhossili on the Gower has one of the most westward mass dials in Wales.

### **The sundial at Cowbridge Physic Garden**

Fixed sundials are often adorned with a motto or saying. The Latin inscription on the sundial in the Cowbridge Physic Garden reads: *Vis medicatrix Naturae*. This means 'the healing power of nature'. The sundial shows the latitude and longitude of Cowbridge:  $51^\circ 28'N$  and  $3^\circ 27'W$ . It was one of the very first things to be installed in the garden and was a gift of the Rotary Club of Cowbridge to commemorate 100 years of Rotary International: 1905-2005. It was designed by Bob Wilson of Llansannor and is based on an original Georgian sundial. The north wall of the garden does not face due south so complicated calculations had to be made to ensure that it gives accurate time: this is why the gnomon is not vertical. It was manufactured by Merlin Design of Bristol: its measurement is 600mm x 500mm and it is made from 3mm thick brass which has been patinated to make it look old.

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This information sheet was produced in July 2007 by Sylvia Parkin, a volunteer at Cowbridge Physic Garden.

**Further information:** The information in this leaflet came from a range of sources, including the



COWBRIDGE  
PHYSIC GARDEN  
GARDD BERLYSIAU'R  
BONT-FAEN

## INFORMATION NOTES

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internet. The main publications used were:

*Sundials*. Christopher St J.H. Daniel, Princess Risborough: Shire Books, 2004.

*Longitude*. Dava Sobel. London: Fourth Estate Ltd, 1996.

[www.sundialsoc.org.uk](http://www.sundialsoc.org.uk)