

7th August

Memory verse:

The Lord is thy keeper:

the Lord is thy shade upon thy right hand.

Psalm 121:5

Another bridge!¹

Why am I giving you another lesson about a bridge?

We had bridges on March 15th, April 9th, April 12th,

June 30th and recently on August 4th. There are

lessons on bridges to come on August 21st and October 10th. Surely that is enough isn't it? Well, I just could not resist this one and I hope you'll agree that it is one of the world's most interesting bridges when you have read today's lesson.



When Samuel Smiles (1812-1904) wrote his famous book *The Lives of the Engineers*, one of his objectives was to show what could be done by sheer hard work and perseverance. He wanted people to know that it was possible to overcome poverty and lack of formal education and contribute something to society that would benefit everyone. When he selected the Welsh preacher and bridge-builder William Edwards (1719-1789) who died on 7th August as one of his engineers, Smiles certainly chose a good example. But there was far more to William Edwards than even Samuel Smiles realised.

If you ever visit the old chapel at Groeswen (near the then small market town of **Caerphilly**) you will find a memorial table that describes William Edwards as, *Adeiladydd I'r Ddeufydd* – ‘A builder for both worlds’... The Groeswen Chapel is sometimes called the “Westminster Abbey of Wales” because so many famous Welshmen were members of the chapel and so were buried there! The chapel carries a plaque to his memory because, although he is *not* buried there, he was minister of the chapel.

William grew up on a farm called Ty Canol, on the side of **Mynydd Meio** overlooking Caerphilly. When he was just a little boy of seven his father was drowned trying to cross the River **Taff** in a flood on his way home from market at **Llantrisant**. It was probably because of their deteriorating financial circumstances after the death of William's father that the family had to move to a less prosperous farm, Bryn Tail, where rent would have been lower. Here William was to live for the rest of his life.

Smiles describes William as ‘an obstinate, stubborn, and self-willed boy’ who settled down in his mid teens. One of William's modern descendants wonders if this change of character may be ascribed to his conversion.



The family was not well-off and William earned money building dry stone walls. William quickly became noted for his skill in walling and was in demand for his services. William loved working in stone. He began to make a study of the walls of the nearby Caerphilly castle in order to find out how the old masons had done their work. Then he was able to watch closely while some stone masons came to build a blacksmith's workshop and shed. He saw the way they used their hammer-point to dress the rough stone. He tried to do the

¹ Image: By User:Chowell's~commonswiki - File:Pontypridd New Bridge.jpg, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=103185417> information from <http://daibach-welldigger.blogspot.com/2012/06/william-edwards-bridgebuilder-and.html?q=William+Edwards> and other sources.

same with his own but alas, it was not tipped with steel and he could not copy what they were doing. When he found out the cause of the problem he quickly got his hammer improved by the local smith and tried again. This time he could imitate the stone masons perfectly. Next he built a shed for a neighbour who taught him basic arithmetic in return, something he would certainly need if he was going to take his abilities as a stone mason further.

One of the best known preachers in Wales in those days was the Independent minister Edmund Jones (1702-1793), nicknamed 'The Old Prophet' who ministered at Aberystwth and then **Pontypool**. He asked Howel Harris (1714-1773), a well-known preacher, to preach in Caerphilly on Whit Monday 1738. William was then 19 years old and it seems Harris's preaching on this occasion had a great effect on him. The Lord seems to have been working in William's heart in his teens but now he was truly converted. Now it was that he began to be "a builder for both worlds".

William's next earthly building task was to construct a water mill and it was doing this work that he learned to build arches. All this time he had had no training or apprenticeship but his fame as a skilled, conscientious and reliable workman now reached **Cardiff** and he went there to build an iron forge. While there he lodged in the home of a blind baker who, unlike William, spoke both Welsh and English. The baker taught William English and this was very useful to him as a builder too. Now in his twenties, William married and his wife, Margaret, was a help to him throughout the rest of his life.

At the family farm, Bryn Tail, there was a godly farm labourer named Harri Smith. This good man encouraged William to preach, which he began to do. At the age of about 22 he began the construction of a small chapel at a place called Waun Fach near the present Groeswen Chapel, to meet the needs of the local community. This small building was the first chapel belonging to the Calvinistic Methodists in Wales. William became the joint pastor of the church that met in that building.

Now William began to have a very high reputation as a builder. He was commissioned to build a bridge over the river Taff at **Pontypridd**. He was to be paid £500 and for that he was to construct the bridge and maintain it for seven years.

This is the point at which disaster struck. For the first bridge was admired by all who saw it and proved very useful but it had had several arches with piers in the river and this proved its undoing. There was a flood and the arches blocked up with debris, whole trees and even haystacks, carried along by the flood water. The water mounted behind the blocked bridge until the force was so tremendous that it swept the bridge away completely.

William had to start again and he thought of a bold solution to the problem of flood debris. He would build a bridge with just one single huge arch. This would have no piers to cause blockages if a flood occurred. He set to work but before he could finish his grand design disaster struck again. In this extract from his son's account, William explains how he discovered what had happened – and still managed to preach on the Sunday evening afterwards.

After morning preaching I was walking on the banks of the river and musing on the excessive force and violence of the waters, when the timber of my bridge came floating down the river. I saw the evil and that nothing could then be done... it was a settled principle with me to discard all secular concerns from my mind on the Sabbath, that nothing should disturb the duties of that day. The next morning every exertion was made to collect the stray timbers that had fixed on various parts of the banks. I had embarked much of my property in this undertaking so that my personal loss was great...

In great perplexity and grief, I called the workmen together and represented to them how the case stood. There was no difficulty in rectifying the error, there was plenty of material, but I had no money, nor could I apply for any after what had happened. Most of the men made this memorable reply: 'master, we will work for you without wages, as long as we can find bread for our families and ourselves.'

To understand what happened next you need to know about some of the various parts of a bridge. The crown of the arch is the top of the arch, centred around the keystone in the very middle. Below the crown on either side are the curved haunches. The area under this is called the springing: this is where the curve of the arch begins.² A stone bridge over a wide river is usually (like William's first bridge) made of several arches supported on piers. To build a bridge across a wide river such as the Taff without piers but with a single arch would require very strong haunches.

William set to work yet again. He had worked hard on the plans. According to Samuel Smiles this next bridge was

...a much more solid work... in consequence of the width of the arch, which was not less than 140 feet, the segment of a circle of 170 feet in diameter. No such experiment had yet been attempted in England; and on the Continent, where the science of bridge-build was much better understood, the only bridges of larger span were of ancient construction, chiefly Roman. The beautiful bridge of the Rialto, at Venice, was the largest span attempted in modern times, and its width was about 100 feet.

The result of Edwards's daring experiment proved its difficulty. He succeeded in finishing the arch, but had not added the parapets, when the tremendous weight of the masonry over the haunches forced them down. The light crown of the bridge sprang up, the key stones were forced out ... the labour of Edwards was lost, and his masonry lay a ruin at the bottom of the river. Yet not altogether lost: for he learnt from experience, dearly bought though it had been.

William's was contracted to build and maintain the bridge. There was nothing for it but to try again. What could he do to lessen the tremendous weight and take the pressure off the keystones of the arch? The answer was a stroke of genius and it can be seen clearly today for the bridge still stands. The three holes you see on either side of the bridge lessen the weight of the structure sufficiently to prevent it collapsing. William had designed and built the longest single span bridge in the world!



But now William was in debt. He had had to borrow to continue the project he had contracted to undertake and he now owed around £600. This was a huge sum of money in those days. Happily the beauty and usefulness of the bridge was such that the local gentry joined together to finance the undertaking and so get him out of debt.

² For full descriptions and clear diagram see <https://stonearchbridges.com/glossary-of-stone-arch-bridge-terms/>



William went on to build more bridges and some of his sons were bridge-builders after him. Can you see what he is holding in his hand in this portrait? What does he have on the table in front of him? Why do you think the artist has included them?

The little chapel at Waun Fach, and later the larger nearby Groeswen Chapel, prospered under God's gracious hand and William seems to have been a sound and fervent preacher. In view of what had happened to his father, it is a poignant thought that William engineered the first bridge over the Taff, preventing the need to ford the dangerous river ever again. It is lovely too to think of a man so skilled in building bridges on earth faithfully pointing so many sinners to the bridge that leads from earth to heaven, the Lord Jesus Christ.

Map work

If you have a good atlas of Britain you can find the places mentioned in the story. How far was William's father travelling to market?

Something to draw

The area around William's bridge is now very built up and a newer bridge with piers has been built right alongside it. However, in his day it was a wild and romantic spot, full of beauty. Far from destroying this, William's rainbow shaped bridge added to the scene making it very picturesque. Visitors and artists came to view it and William Turner painted it in water colour.³ Benjamin Heath Malkin (1769-1842), who paid it a visit, wrote:

The vale of Taff displays itself at once, in the very spot where its artificial and natural beauties are most eminently combined. The confluence of the Taff and Rontha Fawr [Rhondda Fawr], each rolling impetuously over its bed of rocks; the brawling of smaller and nearer rills, whose waters are unseen, but the sound of their fall distinct; the amphitheatre of hills of which two, the boldest and most grand, seem to defend the passes of the Taff, and to be connected by that stupendous bridge, viewed from this spot in all the triumphs of its art; the luxuriance of the hanging woods diversified by projecting masses of rock, that relieve the eye from the satiety of richness; the hills which close in upon the river above and below this widest part of the vale; all these circumstances, rushing at once upon the sight, after a long Lent of dreariness, combine to make up as pleasurable a scene, as the traveller can wish to recompense his labours.

Where is your nearest bridge with an arch or arches? Can you find out when it was built? Could you go and make a sketch of it? Can you distinguish the crown of the arch, the keystone, the haunches, the springing? Does it have piers?

3 You can see his painting of the bridge here: <https://www.tate.org.uk/art/artworks/turner-the-bridge-at-pontypridd-d00843>

Something to find out about

Thanks to the work of Lord Shaftesbury an Act of Parliament was passed prohibiting the use of climbing boys as chimney sweeps on **7th August** 1840. We met Lord Shaftesbury earlier this month in the lesson about the abolition of slavery.⁴ He also helped John Alfred Groom whose work we will read about later this month⁵ and there is a lesson about Shaftesbury himself coming up in October.⁶ For a gripping story about the climbing boys I recommend Matthew Wainwright's *Out of the Smoke*, published by Wakeman.⁷ You could do some research into the way of life of these poor children using your own history books and encyclopedias.

Something to sing and to listen to⁸

On **7th August** the German composer and choir director Melchior Vulpius (c1570 -1615) died in Weimar. We still find at least one tune by him in modern hymn books it is called after him “Vulpius” and it is used for the old Resurrection hymn “The strife is o'er.” If you know this hymn it would be good to sing it today. The score, words and an audio file are in the optional resources for today so that you can learn it if don't know it already.

From a very poor background Melchior Vulpius was a humble schoolmaster all his working life (he taught Latin) as well as Kantor of the local church. He was a prolific composer and his output includes about 400 hymn tunes! He was adept at writing for small or limited choirs such as he no doubt encountered in his work. Melchior Vulpius had no formal musical education himself but he published a *Compendium of Music*, an instruction manual which was so popular that it was brought out in many editions. He begins his compendium with the question “*Quid est Musica?*” – “what is music?” To which he gives the answer, “*Est bene canendi scientia*” – “it is the science of singing well.” From this starting point he proceeds to explain how to read music and to sing. It must have been a very useful textbook for choristers.⁹

Something to think about

How would you answer the question “What is music?” Why do you think Melchior Vulpius gives the answer he does?

4 Lesson for 1st August.

5 Lesson for 15th August.

6 Lesson for 1st October. (Yet to come.)

7 You can buy it here: <https://tabernaclebookshop.org/products/out-of-the-smoke>

8 Information from <https://www.bach-cantatas.com/Lib/Vulpius.htm> and other sources.

9 You can hear his setting of a popular German carol here <https://www.youtube.com/watch?v=35VWt692Bxg&t=11s> alongside the plain version by Michael Praetorius (about who we learned in the lesson for 15th February.) A longer piece by Vulpius can be found here: <https://www.youtube.com/watch?v=35VWt692Bxg&t=11s>.