ISASC
INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

FULCRUM

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FULCRUM is the newsletter of ISASC(E), the International Society of Antique Scale Collectors (Europe). It is published in February, May, August and November. Contributions should be sent to the Editor, John Knights.

Off With His Head

The Tower of London is an ancient and imposing edifice standing just beyond the Eastern edge of the City of London. The construction was begun by William 1 who had the White Tower (the big bit in the middle) built in the 11th century to impress the locals and nail on the impact of his conquest. The rest of the complex grew up over the following centuries.

During its heyday it was an awesome royal palace and the scene of much bloodshed and violence. Today it is a jolly tourist attraction where strangely attired Yeoman Warders curdle the blood of American tourists with tales of historic murders and executions.

Some of the peripheral parts of the Tower are, in fact, something of a Victorian confection and many of the grim medieval structures are of comparatively recent construction.

The Byward Tower, however, does contain a true piece of medieval art in the form of a wall painting that was discovered when later plasterwork was removed. The painting, dating back to the reign of Richard 11, depicts a religious tableau with John the Baptist on the left and the

Archangel Michael to the right. There was originally a central crucifixion scene but this was somewhat obliterated in Tudor times when someone decided it was the ideal site for a fireplace. St Michael who is usually depicted, in art, either wielding a spear to vanquish Satan or a large balance as a symbol of judgement is in this case in balance mode! The painting dates back to a time when the Byward Tower was the site of the Royal Mint where currency was struck. As part of the process goldsmiths brought gold and silver plate to the Mint to sell for conversion into coins. As is well known, the whole gold and silver thing is fraught with many possibilities for dirty doings and the ease with which plate could be adulterated spawned the elaborated and venerable Hallmarking system that is still operated in the UK and many other countries. The wall painting with its high religious message and allusion to judgement was supposed to be a deterrent to merchants from offering false wares to the mint. There were, of course, more immediate, rather unpleasant penalties available for malefactors but the prospect of celestial sanctions held a lot more sway in the Middle Ages.

Down by the Station

Back in the summer I got to go on a one day railway excursion where we went from Grimsby to Carlisle via the Settle and Carlisle viaduct. The USP of the occasion was that the train was towed by a proper steam engine rather than a 'smelly' diesel. In reality I have to say the whole steam train experience did a lot less for me than the other people on board, many of whom seemed to be in a high state of ecstasy as we chugged along across the country. To my philistine mind the romance of steam was somewhat overrated and I'm not the least surprised that it was superseded by diesel, which is actually a lot less smelly, at the earliest opportunity.

In order to permit the acolytes to worship at the altar the train stopped at Appleby where everyone piled out onto the platform to photograph the engine as it took on water or something. I had a quick look but upon seeing the begrimed state of the driver and fireman I retreated up the platform to the clean end. A quick look in the station office however caused my spirits to lift a little as I saw a nice old Pooley parcel scale, above left. These steam folk! What a bunch of nerds.

Face Book and Twitter

Frances Simmons has been busy getting the Society linked up to the modern world by putting us onto the large social media sites Face Book and Twitter. Some of you will know a lot more about these sites than I do but they are now considered the main ways of communicating with other people who may share common interests. By extension they are also an efficient way of advertising an organisation such as ours. The sites are at an early stage so far and will require populating with photographs and snippets of information that might appeal to others and help to garner interest. An article by Frances, setting out the manner in which these sites operate

and the way that information can be added will follow in a later edition of Fulcrum. This is a potentially valuable tool for advertising our society and we have to thank Frances for her efforts.

Heavy Man!

Modern person weighing scales, designed for medical use are usually little wobbly plastic devices designed for portability and ease of use. By contrast I recently encountered a baby weighing scale from a previous era. Made of cast iron it's clearly not designed for portability.

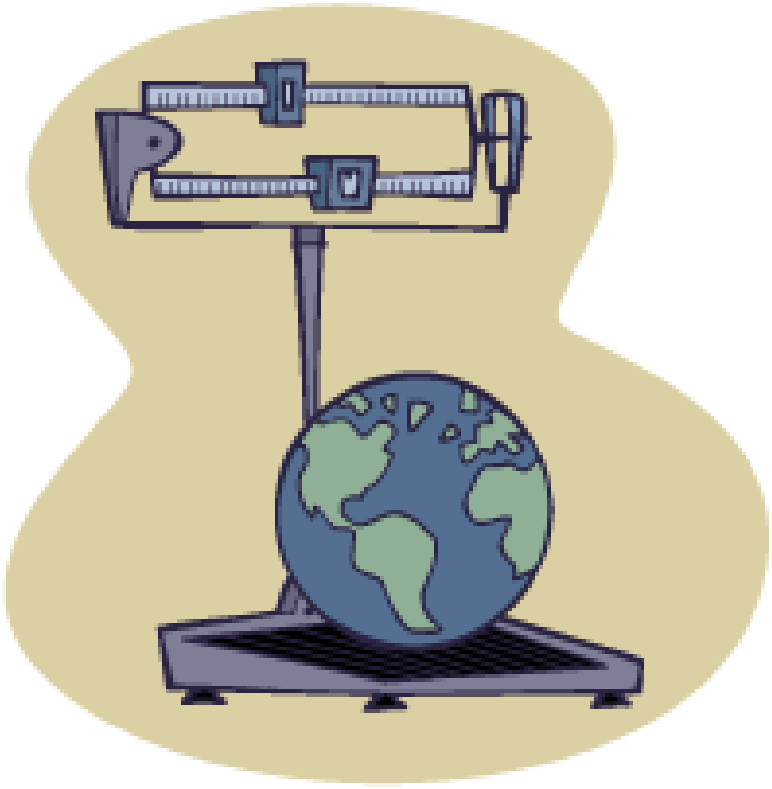
Statues with Scales

In many towns and cities of the world you only have to look up to see a statue equipped with a pair of scales. In the UK the most well known example is that above the Central Criminal Court at Old Bailey in the City of London. The court only dates back to the beginning of the 20th century and stands on the site previously occupied by the notorious Newgate Prison.

The statue (top right), representing justice, holds the balance in its left hand and a sword in the right. Many people think the figure wears a blindfold, to represent the impartiality of the law, but this is patently not the case.

The symbol is pretty much universal and remarkably similar statues are found around the world. Top left shows one in Ouro Preto in Brazil (nice hat), centre left Romberg Germany, bottom left Dublin Ireland. The centre right example stands above the Guildhall in the English city of Bath.

I'm sure there are many more!



Weighing the World

At the 2015 annual meeting the theme was ‘Unusual weighing’ or words to that effect and we were treated to a display of a number of undeniably unusual artefacts!
One particularly unusual weighing activity was performed in the 18th century when it was decided to carry out an experiment to determine the weight and mean density of the Earth. People had been measuring the size of the planet since classical times and its dimensions were pretty well understood by the 1700s. The mass was a different matter and although one unsuccessful attempt had been made, the nature of the world and understanding of what lay beneath the outer skin was still a mystery. In 1761 the English Royal Society had been involved in celestial observations to measure the ‘Transit of Venus’ and strangely enough they had some money left over. Neville Maskelyne, who had participated in the transit project, was appointed Astronomer Royal in 1765 and he suggested that putting money into determining the terrestrial mass would be a good way of using the underspend.
Some 80 years earlier Isaac Newton had formulated his law of gravitation and determined that the magnitude of the force depended on the masses of the attracting bodies and the distance between them. He postulated the existence of a gravitational constant, the so called big G, but it had not been possible to give it a value. Ascertaining the mass of the Earth would also allow G to be calculated.
Maskelyne is not an altogether uncontroversial character as he had also been involved in the ‘longitude project’ to find an accurate method of locating a vessel’s position at sea. In 1763 sea trials were conducted on a ship, bound for the West Indies from the UK, of competing methods of longitude determination. There was a substantial cash prize at stake so the competition was fierce. Two of the methods relied on celestial observation but the third was an amazing piece of engineering devised by an un-regarded but gifted horologist called John Harrison. His timepiece was the first to achieve the necessary degree of accuracy when working on a ship at sea. Maskylene was an aristocratic astronomer who was singularly unimpressed by artisan machines and so took a biased and blinkered view of Harrison’s devices. His opposition was instrumental in Harrison being denied his just rewards until very late in life which does tend to paint Maskelyne as the villain of the story. Taking the broader view, however, his attitude did cause Harrison to refine his device from its original, arcane, ungainly design to a final pocket sized version that could be readily reproduced.
The previous attempt at measuring the Earth’s mass had been carried out half way up the Andes and was hampered by bad weather. To avoid this problem again Maskylene decided to carry out his experiment in the Highlands of Scotland where the weather is famously mild, dry and consistent (there will be a brief pause in the narrative to allow British readers to stop laughing).

He needed to find a large isolated mountain, of symmetrical form and after a degree of searching a suitable peak called Schiehallion was located in Perthshire in the centre of Scotland.

The method involved, firstly measuring the volume of the mountain by standard surveying methods, and estimating the mean density of the rock from which it was formed. In this way a value for the mass of Schiehallion could be established. It was then necessary to measure the gravitational force exerted by the mountain. As the gravitational force exerted by the Earth was well known (Galileo, Leaning Tower of Pisa etc) it would then be possible to estimate the mass and density of the planet.

The measuring of the mountain was technically complex but comparatively straightforward whereas measuring the gravitational pull was decidedly difficult, given that the value was expected to be extremely small. Gravity, the force that holds the Universe together, is remarkably weak compared to the other fundamental forces of nature so the pull exerted by even a large rocky lump like Schiehallion is of a very small magnitude.

The method involved establishing two measuring stations on diametrically opposite sides of the mountain on a line of longitude. The distance between the two sites was then measured by two methods.

Measuring the distance by celestial observation relied on the use of a device called a zenith sector which measures the angle of a fixed star by reference to a vertical established by a plumb line. From this observation the latitude of the observer could be accurately ascertained. The vertical would, however, be subject to deviation caused by the gravitational pull of the mountain so the measurement of the angle and the latitude would thus be subject to a small degree of error.

The same distances were also measured by standard surveying techniques which relied only upon terrestrial observations. Any difference between the celestial and terrestrial estimates would allow the value of the gravitational effect to be calculated.

The exercise began in the summer of 1774 but things did not go altogether smoothly. The weather was, of course, totally atrocious with driving rain hampering any attempts at accurate observation. There were additionally tensions and disagreements among the people performing the various operations and errors in the way the land surveys were performed. The exercise dragged on until the end of October 1774, by which time the weather became really bad. Fortunately sufficient data had been gained and the Astronomer Royal was able to quit his humble Scottish shack and return to London. He announced his findings in the following year, 1775 but they were somewhat overshadowed by the news from the American colonies who had decided to seek independence. He found that the distance between the two sites was 4,364.44 feet (1330.3m). This distance was some 600feet (183m) less than the distance ascertained by celestial observation. This represented an average deflection from the vertical, caused by the pull of the mountain of about 6 seconds of arc.

Some more recent commentators have criticised the Schiehallion experiment as being a somewhat flawed exercise but it did give some useful information about the Earth's physical properties which have been refined over time by use of more sophisticated techniques. The Earth's mass is currently reckoned to be some 6×10^{24} kg and its density about 5 times that of water. This compares to Saturn, one of the great gas giants which would actually float in very large bucket of water.