

*C'est avec un très vif plaisir que nous accueillons Alan Harrison dans Corol'aire. Professeur anglais, il a enseigné les mathématiques pendant 15 ans au Lycée français Charles de Gaulle, à Londres, puis fut pendant 15 ans Directeur des Etudes britanniques (équivalent de proviseur adjoint) dans ce même lycée, il réside actuellement près d'Angoulême. Un second article sera publié dans le prochain numéro. Et d'autres seront les bienvenus ! Qu'il en soit remercié par avance.*  
S.P.

## FUN WITH FURLONGS or "Je me moque des divisions décimales".

The English Charter of Rights, the Magna Carta, was established in 1215 and among other things it imposed a single system of weights and measures throughout the kingdom.

"There shall be one measure for wine and one for ale throughout our whole Realm : one measure for corn and one breadth for cloth ; and it shall be for weight even as it is for measures."

Over the years the medieval equivalent of the second-hand car salesman introduced dubious and local variations but the system by law established was always the standard of reference when in doubt.

It was nearly six hundred years later when proposals for a single system of weights and measures was presented to King Louis XVI by Cassini, the Astronomer Royal. At that time there were over two hundred distinct sets of measures current in France and the need for reform was pressing.

The plan was for a decimal system and this must have been too much for the King for within twenty-four hours he was on the road to Varennes.

Pierre Méchain was given the task of measuring a base line from Dunkirk to Barcelona in order to define the new unit of length. He fared little better than the King. His sponsor, the Académie des Sciences, was suppressed soon after his work started. Funds arrived only irregularly and were eroded by raging inflation. A temporary committee was set up to supervise the work, but what good has ever come out of a committee ? And anyway, within twelve months its most competent members have been purged for being politically unsound. More than once Méchain and his team of surveyors were arrested as suspected terrorists or worse still as monarchists. And just when the work was being completed at the Barcelona end of the line, France and Spain declared war and Méchain was not allowed to leave the country. This enforced repose gave him the chance to recheck his measurements and he was taken by the yellow fever before he could put all the errors right.

When the proposed metric system was finally presented to the government in 1799 it was not a popular success and twelve years later Laplace was still trying to persuade Napoleon to give it his seal of approval. Too late, Napoleon wrote : "Twelve has always been preferred to ten as a divisor. Laplace has himself assured me that if all the objections that I made to him had been pointed out to him before its adoption, he would certainly have recognised its defects and given it up."

Let's give credit where its due. The metric system is simple. It's simplicity itself. Specially designed for mathematical simpletons, and for them, quite useful. But Henri Poincaré said that "the mathematician does not study mathematics because it is useful, he studies it because he delights in it and because it is beautiful."

There are not many delights and even less beauty in the austerity of the metric system, but here are a few delights and surprises that can be discovered hidden within the Imperial System.

First, what about this for the Binary System in poetry ?

2 gills make one chopin  
2 chopins make one pint  
2 pints make one quart  
2 quarts make one pottle  
2 pottles make one gallon  
2 gallons make one peck  
2 pecks make one demibushel  
2 demibushels make one firkin  
2 firkins make one kilderkin  
2 kilderkins make one barrel  
2 barrels make one hogshead  
2 hogsheads make one pipe  
and 2 pipes make one tun.

All of these wonderful names have a long history, coming from Old French, Old Dutch, Old German and some from pre-Roman Celtish. (A gill is about one seventh of a litre.)

Another surprise is derived from medieval architecture, one canon of which was the system of "pariquadrato", that is, the round plan of a sacred building might well be rectangular but it was equal in area to a given square. The most common proportions for the rectangles were 2:1, 3:1 and 5:4. If the given square had a side of  $x$  units, then one side of the 2 by 1 rectangle was  $x / \sqrt{2}$ , one side of the 3

by 1 rectangle was  $x / \sqrt{3}$  and one side of the 5 by 4 rectangle was  $5x / 2\sqrt{5}$  units. We cannot reasonably assume that a medieval square would be measured in meters, but if we take it to have been measured in yards, that is 36 inches, then the first length ( $x / \sqrt{2}$ ) becomes  $25 \frac{15}{32}$  inches, which was the Royal Cubit of ancient Persia and Chaldea ; the second length becomes  $20 \frac{25}{32}$  inches, which was the length of the Egyptian Royal Cubit ; and the third length is  $40 \frac{1}{4}$  inches which was the length of the Egyptian Yard.

Just as there are three feet in a yard so there were three Egyptian Royal Cubits in a Ylon. There was an intermediary unit which was the Geometric Mean of the Cubit and the Ylon whose length was given by the square root of the product of  $20 \frac{25}{32}$  and  $62 \frac{9}{32}$ , which is, of course, 36 inches, the Imperial Yard.

These are just two examples of the fun you can have with the Imperial System and I haven't even mentioned Furlongs yet.

And which English chauvinist said "je me moque des divisions décimales" ? No, you're wrong there. It was Napoleon.

Alan HARRISON.