diſcuſſions reſpecting the ſpecific gravity of bodies, to have the preciſe weight of ſome known bulk of pure water. We have taken ſome pains to examine and com­pare the experiments on this ſubject, and ſhall endea­vour to aſcertain this point with the precision which it deserves. We ſhall reduce all to the Engliſh cubic foot and avoirdupois ounce of the Exchequer ſtandard, on account of a very convenient circumſtance peculiar to this unit, viz. that a cubic foot contains almoſt preciſely a thouſand ounces of pure water, ſo that the speciſic gravity of bodies expreſſes the number of ſuch ounces contained in a cubic foot.

We begin with a trial made before the houſe of com­mons in 1696 by Mr Everard. He weighed 2145,6 cubic inches of water by a balance, which turned ſenſibly with 6 grains, when there were 30 pounds in each ſcale. The weights employed were the troy weights, in the depoſit of the Court of Exchequer, which are ſtill pre­ſerved, and have been moſt ſcrupulouſly examined and compared with each other. The weight was 1131ounces 14 pennyweights. This wants juſt 11 grains of a thouſand avoirdupois ounces for 1728 cubic inches, or a cubic foot ; and it would have amounted to that weight had it been a degree or two colder. The tem­perature indeed is not mentioned ; but as the trial was made in a comfortable room, we may preſume the tem­perature to have been about 55⁰ of Fahrenheit’s ther­mometer. The dimensions of the veſſel were as accu­rate as the nice hand of Mr Abraham Sharp, Mr Flamſtead’s aſſiſtant at Greenwich, could execute, and **it** was made by the Exchequer ſtandard of length.

This is confided in by the naturaliſts of Europe as a very accurate ſtandard experiment, and it is confirmed by many others both private and public. The ſtandards of weight and capacity employed in the experi­ment are ſtill in exiſtence, and publicly known, by the report of the Royal Society to parliament in 1742, and by the report of a committee of the houſe of commons in 1758. This gives it a ſuperiority over all the meaſures which have come to our knowledge.

The firſt experiment, made with proper attention, that we meet with, is by the celebrated Snellius, about the year 1615, and related in his *Eratosthenes Batavus.* He weighed a Rhinland cubic foot of diſtilled water, and found it 62,79 Amſterdam pounds. If this was the ordinary weight of the ſhops, containing 7626 Eng­liſh troy grains, the Engliſh cubic foot muſt be 62 pounds 9 ounces, only one ounce more than by Everard’s experiment. If it was the Mint pound, the weight was 62 pounds 6 ounces. The only other trials which can come into competition with Mr Everard’s are ſome made by the Academy oſ Sciences at Paris. Pſeart, in 1691, found the Paris cubic foot of the water of the fountain d’Arcueil to weigh 69,588 pounds *poids de Paris.* DuHamel obtained the very ſame reſult ; but Mr Monge, in 1783, ſays that filtered rain-water oſ the temperature 12⁰ (Reaumur) weighs 69,3792. Both theſe meaſures are conſiderably below Mr Everard’s, which is 62,5, the former giving 62,053, and the latter 61,868. M. Lavoiſier states the Paris cubic foot at 70 pounds, which makes the Engliſh foot 62,47. But there is an inconſistency among them which makes the comparison impoſſible. Some **changes were made in**

1688, by royal authority, in the national standards, both of weight and length ; and the academicians are ex­ceedingly puzzled to this day in reconciling the dif­ferences, and cannot even ascertain with perfect aſſurance the lineal meaſures which were employed in their moſt boaſted geodetical operations.

Such variations in the meaſurements made by perſons of reputation for judgment and accuracy engaged the writer of this article ſome years ago to attempt another. A veſſel was made of a cylindrical form, as being more eaſily executed with accuracy, whoſe height and dia­meter were 6 inches, taken from a moſt accurate copy of the Exchequer ſtandard. It was weighed in diſtilled water of the temperature 55⁰ ſeveral times without vary­ing 2 grains, and it loſt 42895 grains. This gives for the cubic foot 998,74 ounces, deficient from Mr Eve­rard’s an ounce and a quarter; a difference which may be expected, ſince Mr Everard uſed the New River water without diſtillation.

We hope that theſe obſervations will not be thought ſuperfluous in a matter of ſuch continual reference, in the moſt intereſting queſtions both to the philoſopher and the man of buſineſs; and that the determination which we have given will be conſidered as sufficiently authenticated.

Let us, therefore, for the future take water for the ſtandard, and ſuppoſe that, when of the ordinary tempe­rature of ſummer, and in its ſtate of greateſt natural purity, viz. in clean rain or ſnow, an Engliſh cubic foot of it weighs a thouſand avoirdupois ounces of 437,5 troy grains each. Divide the weight of any body by the weight of an equal bulk of water, the quotient is the ſpecific gravity of that body ; and if the three first figures of the decimal be accounted integers, the quotient is the number of avoirdupois ounces in a cubic foot of the body. Thus the ſpecific gravity of the very fineſt gold which the refiner can produce is 19,365, and a cubic foot of it weighs 19365 ounces.

But an important remark muſt be made here. All bodies of homogeneous or unorganiſed texture expand by heat and contract by cooling. The expansion and contraction by the same change of temperature is very different in different bodies. Thus water, when heated from 60⁰ to 100⁰, increaſes its volume nearly 1/167 of its bulk, and mercury only 1/243 and many ſubſtances much leſs. Hence it follows, that an experiment de­termines the ſpecific gravity only in that very tempera­ture in which the bodies are examined. It will there­fore be proper always to note this temperature ; and it will be convenient to adopt ſome very uſeful tempera­ture for ſuch trials in general : perhaps about 60⁰ of Fahrenheit’s thermometer is as convenient as any. It may always be procured in theſe climates without inconvenience. A temperature near to freezing would have ſome advantages, becauſe water changes its bulk very little between the temperature 32⁰ and 45⁰. But this temperature cannot always be obtained. It will much conduce to the facility of the compariſon to know the variation which heat produces on pure water. The following table, taken from the obſervations of Dr Blagden and Mr Gilpin (Phil. Tranſ. 1792) will answer this purpoſe.