quantity cannot see it is injured; it weighs as heavy as any red wheat we have grown. We have sold a short time back 200 qrs. (three hundred and fifty barrels Irish) to a merchant, mixed three-fourths spring wheat to one-fourth of red winter wheat, at full an average price with us of any quantity or quality sold in our markets to merchants; and we weighed several cooms, that is, four bushels, and they weighed seventeen stone and a half neat each, which is more than any wheat of mine has before weighed; though the corn is not large, is full, and goes close together. I fully think with you, that if winter wheat be damaged, it would be a good way to sow some spring wheat by a man about Lady-day, in the vacant places, and rake it in, as it is sure to be fit to cut with the winter wheat, and, when threshed together, no body can tell it.

For the Belfast Monthly Magazine.

ON CALORIC.

CALORIC, a name given by the late writers on chemistry, to that substance by which the phenomena of heat are produced, and which had before been denominated *igneous fluid, matter of heat, &c.* "There are, perhaps, few subjects," says an eminent writer, "respecting which a more remarkable versatility of general opinion, has been evinced, than with regard to the existence or non-existence of this principle. Are the physical effects of heat produced by the operation of a material fluid, *sui generis*, or is heat merely an affection of matter, consisting in internal vibrations and collisions of its particles, or in some other mode of corpuscular action of which we are ignorant, and is there consequently no such thing as caloric?" The materiality of heat appears to have been the most general opinion, till about the time that Lord Chancellor Bacon wrote his treatise, *De Forma Calidi*, where he considers "heat as the effect of an intestine motion, or mutual collision of the particles of the body heated; an expansive undulatory motion in the minute particles of the body, by which they tend, with some rapidity, towards the circumference, and at the same time incline a little upwards." And this opinion has been adopted with various modifications by Descartes, Newton, Boyle, and almost all the mechanical philosophers of that and the succeeding ages.

The chemists, however, who were most conversant and best acquainted with the effects of this agent, seem to have still retained a strong notion of the materiality of heat, and in consequence of their daily improvements in chemical science, it became again the most prevailing theory; till lately, the experiments of Count Rumford, which, by endeavouring to prove, that heat is imponderable and capable of being produced *ad infinitum*, from a finite quantity of matter, have again thrown some doubt on the subject. It is a well-known fact, that when water freezes, it gives out such a portion of heat during its coagulation, that if it were imbibed by an equal quantity of water, at the temperature of 32° of Fahrenheit's thermometer, the latter would be heated to between 140° and 170°. Hence it would appear, that, if heat were a ponderable substance, a given quantity of water would become lighter when frozen in a vessel hermetically sealed. Count Rumford accordingly made this experiment by the help of a balance of extreme accuracy; but the result was, that the ice produced, appeared to be of precisely the same weight as the water had originally been, at the temperature of 61° viz. 4214.28 grains; from which he infers, that all attempts to discover any effect of heat on the apparent weights of bodies will be fruitless.

The following experiment was also made by the Count, to show the possibility of producing an infinite supply of heat, from a finite quantity of matter, viz. He caused a cylinder of brass to be turned 7¼ inches in diameter, and 9. 8 inches long, which was bored like a cannon with a calibre 3. 7 inches in diameter, and 7. 2 deep, so that the bottom was 2. 6 inches in thickness. The hollow cylinder contained 385¼ cubic inches of brass, and weighed 113.13lbs. avoirdupoise. By means of the engine used for boring cannon in the arsenal of Munich, a blunt borer or flat piece of hardened steel, 4 inches long, 0.63 inches thick, and 3½ inches

wide, was kept with one of its extremities, whose area was 2 one-third square inches, pressed against the bottom of this hollow cylinder, on the inside, with the force of about 10,000lbs. avoirdupois, whilst the latter was turned about its axis with a velocity of 32 revolutions in a minute. The cylinder was in one experiment covered on the outside with a coating of flannel to prevent the access of heat from the atmosphere; in another the borer was made to work through a collar of leathers, so as to prevent the access of air also to the interior of the bore; in a third the whole cylinder was immersed in water, the borer still working through a collar of leathers so as to prevent its access to the interior of the bore; in a fourth, the collar of leathers was removed, and the water had access to the bottom of the interior of the cylinder where the friction took place.

The result was, that in all these experiments, heat was generated by the friction in sufficient quantity to cause about 26½lbs. of ice-cold water to boil in two hours and a half, or at about the same rate as that at which it would have been produced by nine large wax candles; the capacity of brass for heat, or its power of producing it by friction, did not appear to be diminished, and it seemed as if this generation of heat would have gone on for ever if the friction had been continued: the source was inexhaustible.

Now, as any thing which an insulated body or system of bodies can continue to supply without limitation cannot possibly be a material substance, the Count's inference is, that heat is not of this description, but that it must be an effect arising from some species of corpuscular action amongst the constituent particles of the body. It appears, however, that neither of these experiments, nor any that have yet been made, are sufficiently conclusive in favour of the immateriality of heat. For in an indefinite series of material substances, each a thousand times rarer than the preceding, though the weight of the heaviest be imperceptible by the nicest balance, the lightest may, nevertheless be ponderable. Have we any instrument that could discover the weight of a fluid that was only a million times lighter than atmospheric air?

The latter experiment, is perhaps, more difficult to answer satisfactorily; and yet, notwithstanding all the precautions that were taken by the Count, it is by no means demonstrative that the heat evolved was not derived from some exterior source; for there is no absurdity in supposing that a body may be receiving *caloric* in one state, or at one part, and giving it out at another; we have an instance of this in the electric fluid, the materiality of which is admitted by every one. "With regard to this part of the subject," says the same ingenious writer whose sentiments we have already adopted, "it ought not to be omitted, that in another experiment made by the Count, heat was found to be communicated through a *Torricellian vacuum*. Now it is manifest that in such a vacuum there could be nothing to communicate *motion*. Heat, therefore, must be material: the conclusion is almost physically certain.

"Without further insisting, however, that it can be conclusively demonstrated, that there really exists such a substance in nature as caloric, it at least appears upon the whole, that in the present state of our knowledge, we ought rather to consider it as a material substance, because of the two theories, that which supposes it to be so, is infinitely the more intelligible, the more agreeable to the analogy of nature, and the less exceptionable; and we shall accordingly regard it as an elastic fluid, *sui generis*, capable of pervading, with various degrees of facility, all the solid bodies with which we are acquainted, and of being imbibed and retained by them in different proportions according to their respective degrees of specific attraction or capacity for it."

It will readily be admitted, that from the elasticity and power of pervading other substances which is evidently essential to this fluid, that whenever a body is by any means charged with a greater quantity than is proportional to its mass and capacity, when compared with other surrounding bodies, the surplus will be communicated to those neighbouring bodies, until the density of the fluid

in every body in the system becomes equal: this state of density or compression of the caloric contained in a body, constitutes what is commonly called its temperature.

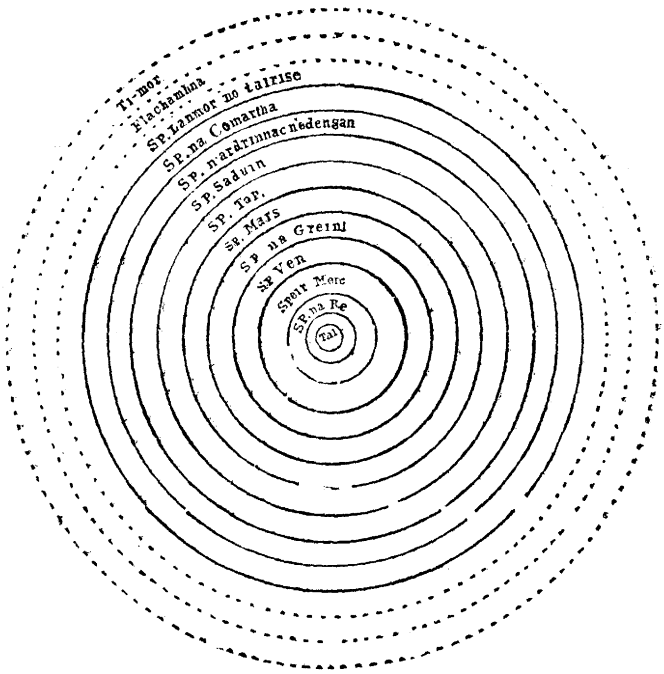
All the properties of this element show that its particles are infinitely small, have no sensible adhesion to each other, and that they have a very rapid, continual motion in all directions, which appears to be essential to them. From what has been said, caloric appears to be a material substance essentially fluid, and many facts concur to prove, that it is the only body which can with propriety be called so in nature; consequently the cause of fluidity in others. The effects of cohesion, a no less universal principle than gravity, are restrained and modified by the agency of caloric; and, as without inertia, all the celestial bodies would be drawn together into some one part of extended space, so, without *heat* all matter in the universe would become a congealed and concrete mass, and fluidity, organization, vegetation and life could have no existence. G.

To the Editor of the Belfast Magazine.

On the Oriental Emigration of the Irish Druids.....Proved from their knowledge in Astronomy, collated with that of the Indians and Chaldeans. From fragments of Irish MSS. By Lieutenant General Vallancey, L.L.D. F.R.S.M.R.I.A: &c.

CHAP. II.

THE following scheme is copied from the manuscript in Mr. Astle's possession, to which I have added two other spheres, viz. the *Flachamhnas* and the *Ti-mor*. In the centre is *Ta-lamh*, the earth (Heb. Talam.)



The names of the spheres are partly Latin, and partly Irish: those of Mercury, Venus, Mars, Jupiter and Saturn are Latin, although we shall hereafter