## HEAT—COLD—CLIMATE—AIR.

The known powers of nature may be reduced to two primitive forces, *attraction* and *repulsion*. The first is the cause of *gravity*; in other words, it is by the attraction which exists between the mass of the earth and all bodies near its surface, that everything has a natural tendency downward; that, in fact, all matters naturally fall to the ground, &c. The second principle is the cause of *elasticity*, and this, by counteracting the effects of attraction, prevents the matter of the universe from becoming a solid mass.

Ancient authors believed, and it is still popularly understood, that there are only four distinct species of elementary or original matter, namely, fire, air, water, and earth. Modern science has however discovered that none of these are to be considered as *elements*, or *primary substances*; while, on the other hand, it has increased the number of elementary *principles* to fifty-two. But as the popular arrangement is sufficient for our present purpose, we will not depart from it.

There is reason to believe that fire, heat, or caloric, is the only *permanently elastic substance* in nature. When it penetrates the pores of any body, it uniformly causes the expansion of such body. A bar of iron is lengthened by being heated, metals and other substances are melted by heat, and by heat water is converted into vapour. There is therefore ample ground for believing that all fluidity is the effect of heat. The natural state of water is ice; and air itself, were there any means of producing a sufficient degree of cold, might probably be reduced to a solid mass.

As all fluidity has heat for its cause, so we find that a much greater degree of heat is requisite to keep one substance in a fluid state than another. Iron, for instance, requires more heat to keep it in fusion than gold; gold much more than tin; but much less suffices to keep wax, much less to keep water, much less spirit of wine, and at last exceedingly less for mercury (quicksilver), since that metal only becomes solid at 187 degrees below the point at which water freezes; mercury, therefore, would be the most fluid of all bodies, if air were not still more so. Now, what does this fluidity, greater in air than in any other matter, indicate? It appears to indicate the least degree of adherence that can be conceived between the parts of which it is composed, supposing them to be of such a figure as only to touch each other at one point. The greater or less degree of fluidity does not, however, indicate that the parts of the fluid are more or less weighty, but only that their adherence is so much the less, their union so much the less intimate, and their separation so much the easier. If a thousand degrees of heat are required to keep water in a fluid state, it might perhaps require but one to preserve the fluidity of air.

It is yet doubtful whether light consists of the same matter with elementary fire or not. The great source of light is found to be the sun, from which it is projected to the earth in the space of about eight minutes; and as the sun is computed to be distant ninety-five millions of miles, light must of consequence travel at the rate of about two hundred thousand miles in one second of time.

Light may be reflected as well as projected. The light which we receive from the moon is only reflected as from a mirror. The light of the sun is three hundred thousand times stronger than the light of the moon.

The air we inhale is composed of 21 parts of oxygen to 79 of nitrogen gas, which are mixed with vapour and small quantities of other gases.

The effects of heat in producing a noxious quality in the air, are well known. The torrid regions under the line are always unwholesome. At Senegal, the natives consider forty as an advanced time of life, and generally die of old age at fifty. At Carthagena, where the heat of the hottest day ever known in Europe is continual—where, during the winter season, these dreadful heats are united with a continual succession of thunder, rain, and tempests—the wan and lived complexions of the inhabitants might make strangers suspect that they were just recovered from some dreadful distemper. The habits of the natives are influenced by the same causes as their colour, and all their motions are relaxed and languid; the heat of the climate even affects their speech, which is soft and slow, and their words generally broken. Travellers from Europe retain their strength and colour, possibly for three or four months, but afterwards suffer such decays in both, that they are no longer to be distinguished by their complexion from the inhabitants. Here, however, this languid and spiritless existence is frequently drawled on sometimes even to eighty. Young persons are generally most affected by the heat of the climate, which spares the more aged; but all, upon their arrival on the coasts, are subject to the same train of fatal disorders. In the memorable expedition to Carthagena, more than three parts of our army were destroyed by the climate, and those that returned from that fatal service, found their former vigour irretrievably gone. Of the expedition to the Havannah, not a [illegible] part of the army were left survivors of their victory; climate is an enemy that even heroes cannot conquer.

The distempers that proceed from those climates are many: that, for instance, called the *Chapotonadas*, carries off a multitude of people, and extremely thins the crews of European ships, whom gain tempts into those regions. The nature of this distemper is but little known, being caused in some persons by cold, in others by indigestion. But its effects are generally fatal in three or four days: upon its seizing the patient it brings on what is there called the black vomit, after which none are ever found to recover.

A different set of calamities prevail in some climates where the air is condensed by cold. In such places the train of distempers known to arise from obstructed perspiration, are very common—eruptions, boils, scurvy, and a loathsome leprosy, that covers the body with a scurf and ulcers. These disorders also are infectious, and not only banish the patient from society, but generally accompany him to the grave. The men of those climates seldom attain to the age of fifty; but the women, who lead less laborious lives, live longer.

One fact our senses teach us, namely, that although the air is too fine for our sight, it is very obvious to the touch. Although we cannot see the wind contained in a bladder, we can very readily feel its resistance; and though the hurricane be colourless, we know that it does not want force. We have equal experience of the spring, or elasticity of the air; a bladder filled with air, when pressed, returns again, upon the pressure being taken away.

So far the slightest experience teaches us; but, by carrying experiment a little further, we learn that air also is *heavy*; a glass vessel, emptied of air, and accurately weighed, will be found lighter than when weighed with the air in it. Upon computing the superior weight of the full vessel, a cubic foot of air is found to weigh 527 grains, while the same quantity of hydrogen gas weighs no more than 40 grains. This is familiarly illustrated in balloons, the ascent of which is at the present time so common in this country. The balloon ascends because the gas with which it is filled is lighter than the quantity of atmospheric air which would fill the same space as the balloon itself, and the ascending power of the balloon, and consequently the weight it will carry, is in proportion to the actual difference between the weight of the gas and the weight of the air. When it is required that the balloon shall descend, some of the gas is let out of the balloon through a valve, just as water might be let out of a barrel. The gas that remains in the balloon is still lighter than the air, measure for measure, but the proportions between the gas originally contained in the balloon and the weight the balloon carries, are destroyed; the balloon with its burden becomes heavier than the air it displaces, and, consequently, the balloon descends.

We learn, therefore, that the earth, and all things upon its surface, are in every direction covered with a ponderous fluid, which, rising very high over our heads, must be proportionally heavy. For instance, as in the sea a man at the depth of twenty feet sustains a greater weight of water than a man at the depth of but ten feet, so will a man at the bottom of a valley have a greater weight of air over him than a man on the top of a mountain.

If by any means we contrive to take away the pressure of the air from any one part of our bodies, we are soon made sensible of the weight upon the other parts. Thus, if we place the hand upon the mouth of a vessel whence the air has been expelled, we feel as if the hand were violently sucked inwards; this is nothing more than the air upon the back of the hand that forces it into the empty space below.

As by this experiment we preceive that the air presses with great weight upon everything on the surface of the earth, so by other experiments we learn the exact weight with which it presses. First, if the air in a vessel be exhausted, and the vessel set with the mouth downwards in water, the water will rise up into the empty space, and fill the inverted glass—for the external air will, in this case, press up the water, where there is no weight to resist, just as one part of a bed being pressed makes the other parts that have no weight upon them rise. In this case, as we said, the water being pressed without, will rise in the glass, and would continue to rise to a height of thirty-two feet. Hence we learn, that the weight of the air which presses up the water is equal to a pillar, or column, of water, thirty-two feet high, for it is able to raise such a column, and no more. In other words, the surface of the earth is everywhere covered with the weight of air, which is equivalent to a covering of thirty-two feet deep of water, or to a weight of twenty-nine inches and a half of quicksilver, which is just as heavy as the former.

It is found, by computation, that to raise water thirty-two feet requires a weight of fifteen pounds upon every square inch. Now, if we are fond of computations, we have only to calculate how many square inches are in the surface of an ordinary human body, and allowing every inch to sustain fifteen pounds we may amaze ourselves at the weight of air we sustain. It has been computed that the ordinary pressure of the air on a man amounts to within little short of forty thousand pounds!

The elasticity of the air is one of its most amazing properties, and to which it should seem nothing can set bounds. A body of air, that may be contained in a nutshell, may be diluted by heat into a sphere of unknown dimensions. On the contrary, the air contained in a house may be compressible into a cavity not larger than the eye of a needle. In short, no bounds can be set to its confinement or expansion, at least experiment has hitherto found all attempts indefinite. In every situation air retains its elasticity, and the more closely compressed, the more strongly does it resist the pressure. If, in addition to increasing the elasticity by compression, it be increased by heat, the force of both soon becomes irresistible; and it has been well said, that air, thus confined and expanding, is sufficient for the explosion of a world.—*From Buffon, Goldsmith, Cuvier, &c.*

THE PEARL.

HALIFAX, NOVEMBER 18, 1837.

From the Acadian Telegraph.

*Papers by the Cordelia* furnish dates from the Continent of Europe to Oct. 10th. Don Carlos was closely pursued in his retreat from the vicinity of Madrid to the *Basque Provinces*; his health is said to have suffered excessively.

The French expedition against Constantine, Algiers, had started on the 1st. Oct.

The Queen of Spain had signed the treaty of amity with Mexico. The Crown thus abandons all claim to that territory

---

Military Movements.—The first division of the 85th Regiment left town on Monday morning on their way to St. John, N. B. The Halifax and Dartmouth Steamer took the men on board at the Steam Boat Wharf, to convey them to Sackville, whence they were to proceed to Windsor, and meet the Steamer for St. John there. His Excellency witnessed the embarkation of the division. The steamer hoisted the Union Jack, which with the throng of "red coats" on her deck, gave her an unusual appearance. As she moved from the wharf the assembled crowd gave hearty cheers, which were responded to by the fine band of the Regiment playing Auld Lang Syne.

As the steamer got into the stream, the Rainbow frigate came down in full sail. While passing the Steamer, a number of her hands flew up the ratlins, and she sent twice three hearty cheers, as farewells to the departing troops. The Steamer responded, and the acclamations were again taken up by the people on the wharves.

On Saturday last, an Address signed by Her Majesty's Council, the Magistrates, and several other inhabitants, was presented to Colonel Maunsel of the 85th.

The Address testified to the good conduct of the 85th, to the sincere regard and good will which existed towards the officers in the inhabitants, and to the assistance rendered by the regiment on occasions of calamity: it concluded with good wishes, and an expression of confidence that the Regiment would gain the good regards of whatever people they should be stationed among.

The Colonel returned thanks for this compliment, expressing regret at the sudden removal of the Regiment from Halifax, and a hope of return and renewal of social intercourse, and wishes of happiness and prosperity.

---

Another Fire.—Tuesday afternoon a fall of snow, accompanied by heavy squalls, gave a very wintry appearance to our streets. At night fall the snow changed to sleet and rain, which came down heavily, impelled by North east gusts of wind. About half past eight the alarming cry of *fire* was raised, and the citizens were roused from their quiet hearths to brave the rigours of the night. The alarm was found to proceed from a large wooden house in Albemarle street, called Rutledge's—but in which Messrs. J. & M. Tobin had the chief interest, by mortgage. The fire was in the garret story of the house, and soon burst from the roof, depressed by the heavy rain, but excited by the strong blasts of wind. It was a fearful struggle: a canopy of black clouds above, torrents of rain falling, and squalls driving and howling without intermission. The fire departments, and military, and many of the inhabitants, mustered quickly, and used strenuous exertions to subdue the common enemy. Copious streams of water were served on each side of the burning pile, from the engines of the Garrison and the Town; and the adjoining house to the north was partially pulled down and the rains water-drenched. Fortunately the house to the southward, on which the flames and embers were blown, presented *stone walls and slate roof* to the danger, and while it escaped itself it formed a barrier in that direction. After about three hours hard labour the fire was subdued, with almost the entire loss of the house in which it originated, and the partial loss of the next.

Notwithstanding the tempest and torrents of rain, the working parties stood their ground with excellent spirit until the danger of spreading was over. The military as usual were very efficient, and the civilians (with some few skulking exceptions, which will always be found on