



## XXI. On the atomic philosophy

Mr. Joseph Luckcock

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XX. *Extract of a Letter from WILLIAM BRUCE, Esq. Resident at Bushire, to WILLIAM ERSKINE, Esq. of Bombay, dated Bushire, 26th March 1813, communicating the Discovery of a Disease in Persia, contracted by such as milk the Cattle and Sheep, which is a Preventive of the Small-Pox\*.*

MY DEAR SIR,—WHEN I was in Bombay I mentioned to you that the cow-pox was well known in Persia by the Eliaats, or wandering tribes. Since my return here I have made very particular inquiries on this subject, amongst several different tribes who visit this place in the winter to sell the produce of their flocks, such as carpets, rugs, butter, cheese, &c. Their flocks during this time are spread over the low country to graze. Every Eliaat that I have spoken to on this head, of at least six or seven different tribes, has uniformly told me that the people who are employed to milk the cattle caught a disease, which after once having had, they were perfectly safe from the small-pox: That this disease was prevalent among the cows, and showed itself particularly on the teats; but that it was more prevalent among and more frequently caught from the sheep. Now this is a circumstance that has never, I believe, before been known; and of the truth of it I have not the smallest doubt; as the persons of whom I inquired, could have no interest in telling me a falsehood; and it is not likely that every one whom I spoke to should agree in deceiving, for I have asked at least some forty or fifty persons. To be more sure on the subject, I made most particular inquiries of a very respectable farmer who lives about fourteen miles from this, by name Malilla (whom Mr. Babington knows very well), and who is under some obligations to me: this man confirmed every thing that the Eliaats had told me, and further said that the disease was very common all over the country, and that his own sheep often had it. There may be one reason for the Eliaats saying that they caught the infection oftener from the sheep than the cow, which is, that most of the butter, ghee, cheese, &c. is made from sheep's milk, and that the black cattle yield very little, being more used for draught than any thing else.

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XXI. *On the Atomic Philosophy.* By Mr. JOSEPH LUCKCOCK.

ALL matter has been supposed on this hypothesis to be composed of mathematical points, without length, breadth or thickness; and that different arrangements of the same identical

\* From the Transactions of the Literary Society of Bombay, vol. i. Though this letter is dated in 1813, the volume in which it appears is only a recent publication.

points, being but one in species, constitute all the various forms of matter in the universe ; and, that the same specific matter should compose a guinea or a lock of hair. A mysterious power was supposed to reside in these atoms, or essence of matter, called *repulsion* ; in this state of the hypothesis, a question arose,—In an aggregate of these points, what was it that filled up the interstices ? It was plain it could not be matter ; for although the essence was solid, that could not be the case with an aggregate of these points ; the interstices must be occupied with *nothing*. Therefore it was necessary, in order to complete the hypothesis ; that this *nothing* should be personified, and from hence arose the invention of a vacuum. I shall pass over the learned disputes whether this *nothing* was created, or whether it possessed the attributes of the Deity, *infinite and eternal*, or merely a local appendage to aggregates of matter, and simply remark, that the parts of this hypothesis are so interwoven, that if any one of them should be removed, the whole must crumble away.

Unfortunately for this system, it admits of no proof ; and what is singularly remarkable, its advocates have been principally mathematicians. It has even been called the mechanical philosophy ; and yet it is incapable of demonstration. A mathematical point may be imagined ; as also the division of a line into an infinite number of parts, but practically we all know these to be among the impossible things. The doctrine of repulsion was necessary to the support of the doctrine of matter consisting of mathematical points, and the moderns have personified it, and say that *caloric* is the great repulsive power. It is easy to conceive a pestle to be a repulsive power, in the operation of pounding a substance in a mortar ; but not so easy to suppose a glass of water to have the repulsive power of grinding a lump of sugar into mathematical points, which should remain suspended in it. It appears to me something like arguing in a circle : Matter must consist of atoms, because there is a repulsive power ; and a repulsive power must exist, because matter consists of mathematical points. The ancients considered repulsion to be a quality ; the moderns, a substance ; caloric they conceive to be balls of various dimensions, and tangible matter (as opposed to mathematical points) to consist of these points insinuated into and occupying the centre of the caloric balls, not unlike the apple in a dumpling. And here I cannot help feeling some regret at being compelled to erase from my dictionary, a word of great pith and meaning, *homogeneous* ; for surely it never can be said that there is any homogeneity in matter thus compounded.

The personification of *nothing*, or a vacuum, is as necessary to the moderns as to the ancients. To the ancients, it was necessary to fill up the interstices of their mathematical points, and to

to the moderns it is necessary to fill up the interstices of their caloric balls; and yet a great advocate of this doctrine, in order to clear up a perplexing difficulty, runs into the absurdity, merely to suit the circumstances of the case, of supposing there must have been interstitial caloric, than which a greater inconsistency was never heard of: interstitial heat and interstitial vacuums are incompatible with each other. Both ancients and moderns have asserted the existence of a vacuum with as much confidence as they would assert the existence of water: but it can only be considered as hypothetical; for there never has a fact been brought forward in favour of the actual existence of a vacuum, that can be considered as conclusive. Mr. Dalton supposes the atoms of all gaseous substances, whatever may be the form of the ultimate particle or nucleus, to be perfectly globular, and will be arranged in horizontal strata like a pile of shot. It is easy to demonstrate this to be an error both in number and in form. Mr. Dalton's atom of water is globular, and his atom of steam or aqueous vapour is also globular. It is well known that when water is converted into steam it is increased in bulk 1986 times; or, in Mr. Dalton's language, the atom of water is surrounded by 1985 atoms of caloric. I will exhibit a section of Mr. Dalton's atom of a gaseous vapour; the central ball is water, all the rest are caloric. (See Plate I. fig. A.)

Section of Mr. Dalton's atom of steam or aqueous vapour. The coats or layers of caloric, or the matter of heat, are

6 12 18 24, &c.

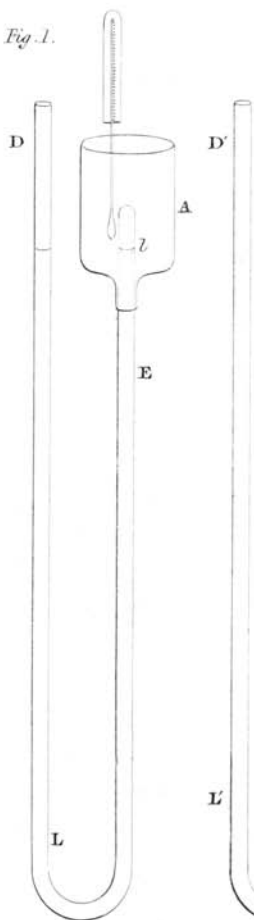
The second strata . . . . . 3 9 15 21, &c.

And I have shown in my Essays\*, fig. 4, Plate I. that the first coat or covering will be 12; from which I have composed the following Table:

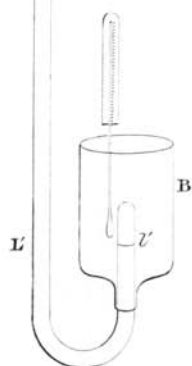
Coats or Coverings.	Number in each.	1st Difference.	2d Difference.	Sum of the Coats.	Equal to 12 multiplied by	1st Difference.	2d Difference.	3d Difference.
1	12			12	1			
2	48	36	24	60	5	4	5	
3	108	60	24	168	14	9	7	2
4	192	84	24	360	30	16	9	2
5	300	108	24	660	55	25	11	2
6	432	132	24	1092	91	36	13	2
7	588	156	24	1680	140	49	15	
8	768	180	24	2448	204	64		
9	972	204	&c.					

\* Of which see notice in last Number of Phil. Mag.

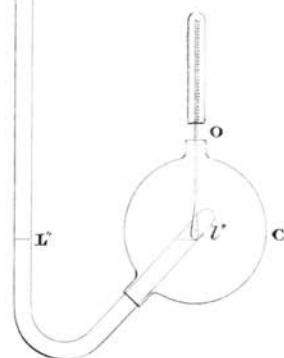
*Fig. 1.*



*Fig. 2.*



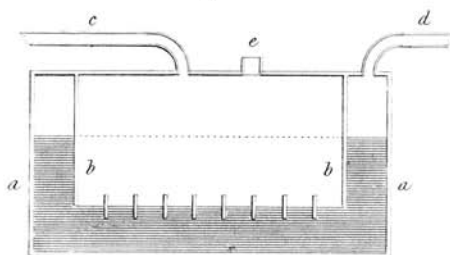
*Fig. 3.*



*Fig. A.*



*Fig. B.*



*S. Porter. sc.*

The first column expresses the number of coats; the second column, the number of atoms of the matter of heat in each coat; the fifth column expresses their sum; viz. of the first coat, of the first and second; of the first, second and third, &c. The other columns show how the table may be extended to any definite length.

I will leave Mr. Dalton to take the seventh 1680, or the eighth 2448, which he pleases; one is 305 too little, the other 463 too much. He may be surprised that he cannot find the number 1985 in the table: this number is a multiple of 5, the numbers in the atomical table are multiples of 12: this hypothesis ought to lead to the conclusion that water would unite to the matter of heat in every proportion found in the fifth column of the table, 1 to 12, 1 to 60, to 168, to every number in the table, even to infinity: but this inquiry naturally leads to one of two results; either the atomical philosophers do not follow nature, or nature does not follow the ingenious conceits of the atomical philosophers. I will not attempt to run through all the vagaries of the system, but will only state that atoms are described as solid, hard, and impenetrable; that water consists of the matter of oxygen, of the matter of hydrogen, and of the matter of heat. It is in vain to say that the matter of heat is only an atmosphere to the other two: if one species of matter consists of atoms, so must all; and how can it be possible for one atom to get into the inside of another? If Nature had employed the mechanical philosophers as her journeymen, all gaseous atoms, instead of being globular, would be double hexagonal pyramids. Nature's laws are too simple for the inventive genius of a mechanical philosopher: the chemical combinations in definite proportions, as explained by Sir H. Davy, are clear, intelligible and satisfactory; while the day dreams of the atomic philosophers are clouds that sully the philosophic horizon, which will soon be dispersed and seen no more.

The views which I have developed in my Essay on this subject are very extensive, and will unfold the arcana of nature in a way that I believe has never yet been considered. I have divided all matter which fills all space, into ponderable and imponderable: imponderable matter is the only ethereal substance; it is the same with caloric, matter of heat, specific heat; fire, or light and heat, the electric fluid, the element of fluidity, and which I have called *fluidium*. Instead of being the great repulsive power, it is the operating cause of all chemical attractions, all chemical action: it unites and is united with all ponderable matter, of which it is the life and soul; for without the aid of fluidium, all ponderable matter would be inert and dead. The way in which the sun acts  
in

in the system, is not by emitting or radiating its own substance (a rude unphilosophic idea), but a change it produces in the electrical relations of all ponderable matter, already united with fluidium; which changes always produce heat and light, in proportion to the intensity of the action. This will also account in a satisfactory manner, why the moon should afford us light, but not heat. Fluidium, in its passage from one lunar ponderable substance to another, produces heat and light, the heat is absorbed by the receiving body, and as the cause is perpetual, so will be the effect: we feel no heat, but the light will be without intermission.

*On the Tides.*

Since my Essays went to press, I have turned over the Asiatic Researches, and had great satisfaction in finding a very remarkable confirmation of my theory; viz. that the tides are not produced by the influence of the sun and moon unitedly or separately, but by the diurnal motion of the earth: see *Observations on the Barometer*, by Dr. Balfour and Mr. Farquhar, 4th vol. Asiatic Researches, Calcutta 1794.

“ 1st. That in the interval between 10 o’clock at night and six in the morning, there existed a prevailing tendency in the mercury to fall.

“ 2d. That in the interval between 6 and 10 in the morning, there existed a prevailing tendency in the mercury to rise.

“ 3d. That in the interval between 10 in the morning and 6 in the evening, there existed a prevailing tendency in the mercury to fall.

“ 4th. That in the interval between 6 and 10 in the evening, there existed a prevailing tendency in the mercury to rise.

“ That there exists a law in nature, by which the mercury of the barometer, let the standing weight be what it may, is liable to the effects of a constant and regular periodical diurnal fluctuation.

“ The periods are evidently connected with the *earth’s diurnal motion*; and, if we had no satellite, might easily be explained by the atmospherical tides caused by the sun. But when we find that the barometer is not in the least observable degree affected by the moon’s passage over the meridian, or by the united action of the sun and moon at the syzygies, we have absolute proof that this cannot be the cause: neither can the expansion of the mercury, being directly opposite to the phenomena, the greatest degree of heat taking place at 3 o’clock, when the mercury is lowest. The observations were taken every half hour during a complete lunation.”

JOSEPH LUCKCOCK.

XXII. *On*