LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

Potential Matter.—A Holiday Dream.

WHEN the year's work is over and all sense of responsibility has left us, who has not occasionally set his fancy free to dream about the unknown, perhaps the unknowable? And what should more frequently cross our dreams than what is so persistently before us in our serious moments of consciousness—the universal law of gravitation. We can leave our spectroscopes and magnets at home, but we cannot fly from the mysterious force which causes the rain-drops to fall from the clouds, and our children to tumble down the staircase. What is gravity? We teach our students to accept the fact and not to trouble about its cause—most excellent advice—but this is vacation time, and we are not restricted to lecture-room science.

Lasage's particles are not satisfactory; they are too materialistic for the holiday mind; but I have always been fascinated by a passage occurring somewhere in Maxwell's writings, where Lord Kelvin is quoted as having pointed out that two sources or two sinks of incompressible liquid will attract each other with the orthodox distance law.

Let us dream, then, of a world in which atoms are sources through which an invisible fluid is pouring into three-dimensioned space. What becomes of this fluid? Does it go on for ever increasing the volume of that all-pervading medium which already fills a vast, but not necessarily infinite, space? When we speak of the constancy of matter, we mean only the constancy of inertia, and how are we to prove that what we call matter is not an endless stream, constantly renewing itself and pushing forward the boundaries of our universe? The conception of atoms as sources of fluid does not, however, necessarily involve such a perpetual increase of substance, for an equal number of sinks may keep withdrawing the increment.

These sinks would form another set of atoms, possibly equal to our own in all respects but one; they would mutually gravitate towards each other, but be repelled from the matter which we deal with on this earth. If matter is essentially dynamical, and we imagine the motion within an atom to be reversed, the question arises whether the reversed motion is similar to the original one; in other words, whether the new atom so formed may by a change of position be brought into coincidence with the old one. And if this is not the case, we must ask ourselves whether the new atom will behave gravitationally like the old one. If atoms are sources of liquid there would be no reciprocity, and the sinks would form another and so far unrecognised world. But sources and sinks compel us to the supposition of a fourth dimension, which belongs to the domain of nightmares, not of dreams, and we try to shake ourselves free from the idea.

I, for one, cannot quite succeed in this effort, for something has been left behind, which is not easily got rid of, when once its symmetrical beauty is perceived. Surely something is wanting in our conception of the universe. We know positive and negative electricity, north and south magnetism, and why not some extra terrestrial matter related to terrestrial matter as the source is to the sink, gravitating towards its own kind, but driven away from the substances of which the solar system is composed. Worlds may have formed of this stuff, with elements and compounds possessing identical properties with our own, undistinguishable in fact from them until they are brought into each other's vicinity. If there is negative electricity, why not negative gold, as yellow and valuable as our own, with the same boiling point and identical spectral lines; different only in so far that if brought down to us it would rise up into space with an acceleration of 981. The fact that we are not acquainted with such matter does not prove its non-existence; for if it ever existed on our earth, it would long have been repelled by it and expelled from it. Some day we may detect a mutual repulsion between different star groups, and obtain a sound footing for what at present is only a random flight of the imagination.

Even now some might argue that we possess some substantial evidence of repulsive forces. In our glorification of the Newtonian system we are apt to overlook some obvious facts which the law of gravitation fails to explain. One of these is the rotational velocity of our solar and of many stellar systems, which cannot be self-generated. Unless we threw our laws of dynamics overboard, or imagine the rotation to have been impressed by creation, we must conclude that some outside body or system of bodies is endowed with an equal and opposite angular momentum. What has become of that outside body, and how could it have parted company with our solar system, if attractive forces only were acting? Another unexplained fact is found in the large velocities of some of the fixed stars, which, according to Prof. Newcomb's calculations, cannot be explained by gravitational attractions only.

The atom and the anti-atom may enter into chemical combination, because at small distances molecular forces would overpower gravitational repulsions. Large tracts of space might thus be filled unknown to us with a substance in which gravity is practically non-existent, until by some accidental cause, such as a meteorite flying through it, unstable equilibrium is established, the matter collecting on one side, the anti-matter on the other until two worlds are formed separating from each other, never to unite again.

Matter and anti-matter may further coexist in bodies of small mass. Such compound mixtures flying hither and thither through space, coming during their journey into the sphere of influence of our sun, would exhibit a curious phenomenon. The matter circulating in a comet's orbit, the anti-matter repelled and thrown back into space, forming an appendage which is always directed away from the sun. Has any one yet given a satisfying explanation of comets' tails; is the cause of coronal streamers known, and can any one look at a picture of the great prominence of the 1885 eclipse, and still believe that gravitational attraction or electric repulsion is sufficient to account for its extravagant shape? But this is not a scientific discussion. I do not wish to argue in favour of the existence of anti-atoms, but only to give my thoughts a free course in the contemplation of its possibility.

What is inertia? When the atom and anti-atom unite, is it gravity only that is neutralised, or inertia also? May there not be, in fact, potential matter as well as potential energy? And if that is the case, can we imagine a vast expanse, without motion or mass, filled with this primordial mixture, which we cannot call a substance because it possesses none of the attributes which characterise matter ready to be called into life by the creative spark? Was this the beginning of the world? Is our much-exalted axiom of the constancy of mass an illusion based on the limited experience of our immediate surroundings? Whether such thoughts are ridiculed as the inspirations of madness, or allowed to be the serious possibilities of a future science, they add renewed interest to the careful examination of the incipient worlds which our telescopes have revealed to us. Astronomy, the oldest and yet most juvenile of sciences, may still have some surprises in store. May anti-matter be commended to its care! But I must stop—the holidays are nearing their end—the British Association is looming in the distance; we must return to sober science, and dreams must go to sleep till next year.

Do dreams ever come true? ARTHUR SCHUSTER.

Live Frog taken out of a Snake.

YOUR correspondent, Colonel Major, may be interested to hear of another instance of a Batrachian returning alive from the stomach of a snake. A grass snake of about 24 inches, kept in captivity, had not fed for three weeks: it was then given a very large specimen of the common frog, full-grown; this was swallowed at once, in the usual way by taking the hind leg first. In about an hour and a half the frog was a third of the way down the snake's body. Then, on the snake being played with and handled, after some minutes the lump began to move up rapidly towards the head of the snake, the mouth opened and out slid the frog; rather off colour, and not very happy-looking, but quite able to hop about in a shuffling fashion, though decidedly shaky on his legs. To an amphibian imprisonment without air could not be very hurtful for a few hours, were it not for the poison of the gastric juices. When the grass snake was left again with the frog it re-swallowed its prey. A snake will often take half an hour swallowing a frog: the distension of the jaws during the operation is extraordinary to witness. In about an hour's time the frog will be a third of the way down the snake's body. ROSE HAIG THOMAS.

Badenweiler, August 14.