

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.]

Coleridge's Theory of Life.

THE old subject of the nature of the vital force or vitality having lately been under discussion, allow me to remind some of your readers that Coleridge did not hesitate to enforce his opinion that it came into the domain of the scientific inquirer, and appertained to the other forces in nature. I cannot express an opinion on his theories of the nature of life, but his holding them in any tangible form has had great weight with some persons, in consequence of his being an orthodox Christian, belonging to what is called the religious world, yet he considered that the nature of life was open to investigation like any other natural phenomenon.

I may be allowed to quote a few passages for the information of those who are not familiar with his essay on the "Theory of Life." Coleridge's idea was that physical life is a process or mode of operation, as we recognise under such names as magnetism chemical affinity, for these, he says, by their own properties affect all the results observed in life. "Life supposes a universal principle in nature with a limiting power in every particular animal, constantly acting to individualize and as it were figure the former. Thus then life is not a thing—a subsistent hypostasis—but an act and process." "To account for Life is one thing, to explain Life another. To a reflecting mind indeed, the very fact that the powers peculiar to life in living animals include cohesion, elasticity, &c. (or, in the words of a late publication) 'that living matter exhibits these physical properties' would demonstrate that in the truth of things, they are homogeneous and that both the classes are but degrees and different dignities of one and the same tendency. Unless therefore a thing can exhibit properties which do not belong to it, the very admission that living matter exhibits physical properties, includes the further admission that those physical or dead properties are themselves vital in essence, really distinct but in appearance only different; or in absolute contrast with each other." "If I were asked for what purpose we should generalise the idea of Life thus broadly, I should not hesitate to reply that were there no other use there would be some advantage in merely destroying an arbitrary assumption in natural philosophy and in reminding the physiologists that they could not hear the life of metals asserted with a more contemptuous surprise than they themselves incur from the vulgar when they speak of the life in mould or mucor. But this is not the case. This wider view fills up the arbitrary chasm between physics and physiology and justifies us in using the former as means of insight into the latter."

The author then proceeds to discuss his argument through the lowest creatures in animal life until he reaches man.

"The arborescent forms on a frosty morning to be seen on a window or pavement must have some relation to the more perfect forms developed in the vegetable world." He then alludes to the different classes of animals, and says, "as the individuals run into each other so do the different genera. They likewise pass into each other so indistinguishably that the whole order forms a very network. Man forms the apex of the living pyramid. He has the whole world in counterpoint to him but he contains an entire world within himself."

It is clear, therefore, that Coleridge (and others may do the same), whilst holding strictly to the belief in a spiritual existence, yet regarded vitality from quite a different point of view, resulting, indeed, from a combination of forces as we see in other phenomena of nature. SAMUEL WILKS.

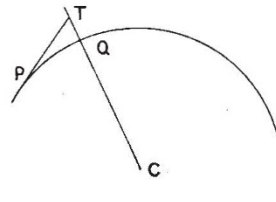
Psychophysical Interaction.

SIR OLIVER LODGE says (p. 53) that he would "interfere with the course of nature," regarded as a mechanically determinate problem, even by lifting a log. Why so? The course of nature is exactly what happens, is it not? It is the business of scientific men to find out the course of

nature, and the various connections which give it coherence and consistency and determinancy. This has been largely done, even in vital processes; and in the obscurer regions of psychics it seems probable that the course would be determinate if we knew all the circumstances. In any case we have nothing else but the course of nature to go by, in the determination of its laws, and that psychic phenomena are natural phenomena is, it seems to me, the only rational view to take. OLIVER HEAVISIDE.

MAY 21.

MAY I contribute a pictorial illustration to the controversy raised by Sir Oliver Lodge?



P Q, part of a circular path described by a body of mass m round a fixed centre C, under the influence of a constant centripetal force of magnitude F. Whether this is supplied by a string with a tension F or by an attraction which will be constant if the path is circular does not seem to matter in the least.

Now let P T be the tangential distance which would be traversed in a time t if the centripetal force were absent.

When that force is introduced, P will come to Q instead of to T, and the work done by the force consists of pulling the mass from T to Q in the time t . The energy required to do this is $F \times T Q$, and the same amount is required and absorbed in each successive interval of t . This result is not affected by calling F a guiding force, which it is. If instead of a body describing a circle we had dealt with a body at rest in the position T, the energy required to bring it to Q would be exactly the same.

If Newton had had to express himself (modern fashion) in terms of energy, can we imagine him dealing with the problem except in some such way as my drawing indicates? Athenæum. G. W. HEMMING.

ATMOSPHERIC ELECTRICITY.

UNTIL within the last two or three years, the advances made in our knowledge of atmospheric electricity were mainly due to the investigation of the electric field of the earth. An interesting summary of the facts brought to light by such investigations will be found in a paper by Exner in "Terrestrial Magnetism and Atmospheric Electricity" (vols. v., p. 167, and vi., p. 1).

Except at or near places where rain (or other form of precipitate) is falling, there is in the free atmosphere an electric field tending to drive positive electricity downwards; the earth's surface is thus in fine weather regions negatively charged. The strength of the electric field and the magnitude of the charge per square centimetre on level ground at a distance from trees or buildings may be found by observing the potential at a measured height. According to Exner, the normal (fine weather) potential gradient in European latitudes varies from about 80 volts per metre in summer to 400 or 500 volts per metre in winter.

It has now been established by means of balloon observations that the intensity of the electric field in fine weather begins to diminish when a comparatively small altitude is reached, and at a height of 5000 metres has only a small fraction of the intensity at the earth's surface. This shows that the lower layers of the atmosphere possess a positive electrification very nearly equivalent to the negative charge on the ground.