coloured *Calanus* on the beach with his hand, shows that these creatures had passed through some unfavourable conditions. Dr. Murray has endeavoured to show that these deep-sea animals are brought to the surface through the movements of large bodies of water during gales or during calms following gales. However this may be, their proper habitat is certainly at the bottom. When they do come to the surface they form oily-like streaks or small spots, where herrings and other fish and birds may be seen feeding upon them. The *Nyctiphanes* at any rate remain but a very short time at the surface. On one occasion in Kilbrennan Sound we were attracted to a spot where guillemots, gulls, and other birds were feeding, and we found that their stomachs were filled with perfectly fresh *Nyctiphanes*, and the *Nyctiphanes* themselves could be distinctly seen on the surface for a short time. The fishermen shot a circle trawl-net around this spot, and procured twelve boxes of herrings, the stomachs of which were distended with these Crustaceans in all stages of decomposition. I can show these stomachs to any one visiting this Station.

In my previous letter I mentioned that we had captured herrings in the deep water with their stomachs filled with these Crustaceans, and skate, which feed at the bottom, have been taken in depths over 50 fathoms with herrings in their stomachs. When the herrings' stomachs are filled with adult *Nyctiphanes*, as above stated, the herrings are not commonly called "gut-poke," or at least are not looked upon as diseased. The so-called disease is attributed to those herrings which have been feeding chiefly upon the young *Nyctiphanes*, or "black-eye."

I do not claim that there is anything new on this subject in my letters, nor do I see anything new in that of Mr. Calderwood, except the statement that Copepods alone are the cause of the the so-called "gut-poke" disease, which I do not believe. The whole of this information was published many years ago. In a lecture delivered in November 1887, as reported in the *Scotsman* of November 23, Dr. Murray said regarding the "poke-gut":—

"There was also a kind of herring called the 'poke-gut' herring, which was supposed to be suffering from some disease or complaint. This was a herring whose stomach was distended with food, which consisted of one or other of the minute animals to which he had referred. One of the commonest things to be told on the west coast was that the 'poke-gut' herrings were not fit for food, and would not cure. The fishermen told them that they had eaten some 'black stuff,' the effect of which was to make them sick, that it burned a hole in their bodies, and acts as if they had eaten quicklime. For a long time he was very doubtful as to what the explanation of this belief could be, but he ultimately found that the cause of it was this—that the poke-gut herrings had been feeding on the young *Nyctiphanes*. The eyes of these creatures are very black indeed (as Dr. Murray showed by exhibiting a bottleful of the creatures in a preparation of glycerine), and an accumulation of these in the stomach of the herring gave the whole contents a very black aspect. On being taken into the boat, decomposition set in very rapidly, the lining of the stomach was speedily eaten away, and before long an actual hole, as the fishermen said, was made in the body, out of which this black mass exuded. In this 'poke-gut' state the herring, however, was simply engaged in laying up a store of fat, the nutritive processes of the animal being then exceedingly active. When it had laid in this store of fat, the herring then sought the shallow waters of the shore for the purpose of depositing its spawn. Mr. Hoyle spent several months at Peterhead examining the stomachs of the herring to ascertain what they fed upon during the fishing season, but the result of his investigations was that he did not find in any one of them a full meal. Similar results were obtained by Mr. Beddard at Eyemouth, and by Prof. Herdman on the coast of Arran."

Our observations on board the *Medusa* went to show that the "poke-gut" condition of the herring was chiefly due to the large number of young *Nyctiphanes* contained in the herrings' stomachs, but Mr. Calderwood makes no mention of any Crustacea beyond Copepods.

ALEXANDER TURBYNE.

Scottish Marine Station, Millport, Cumbrae, November 29.

The Theory of Magnetic Action upon Light.

I HAVE already pointed out that the various questions relating to the theory of the action of magnetism upon light cannot be disposed of by arguments based upon vague and obscure general reasoning, but require a careful mathematical investigation for their elucidation. I therefore propose in the present letter to state, as briefly as possible, the results to which an examination of Mr. Larmor's theory leads, and to show how my own theory may be amended so as to remove the objection concerning the discontinuity of the E.M.F at an interface.

I find that Mr. Larmor's theory requires that all the equations of Maxwell's general theory of the electro-magnetic field should remain unaltered, except the equation

$$P = -F - d\psi/dx,$$

which must be modified by the insertion of the additional terms

$$-p_3\dot{\xi} + p_2\dot{h} + zd\phi/dy - yd\phi dz \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where p_1, p_2, p_3 are constants depending on the magnetic field, and φ is a potential function.

The first two terms are equivalent to introducing Hall's effect; but for the last two there is no justification whatever. They are not required in optics nor in electro-magnetism. These results, combined with Larmor's boundary conditions, prove my statement that his theory makes the tangential component of the E.M.F. *discontinuous* at an interface.

In the next place, a satisfactory theory may be constructed by modifying Maxwell's relation between E.M.F. and electric displacement, keeping all the other equations unaltered. The proposed modification is

$$P = 4\pi f/\kappa + p_3\dot{\xi} - p_2\dot{h} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

It will be found that this hypothesis leads to exactly the same equations of motion and boundary conditions as those given in my paper in the *Phil. Trans.*, 1891; but that, in consequence of the relation (2), the tangential component of the E.M.F. is *continuous* at an interface. The other boundary condition is, continuity of the tangential component of the magnetic force.

According to Maxwell's theory, the electrostatic energy is given by the expression

$$\tfrac{1}{2}(Pf + Qg + Rh);$$

and if we assume that this result holds good when P is given by the modified form (2), it will be found that all the results can be deduced by means of the principle of least action.

Under these circumstances, I think I may justly claim to have placed the theory of Kerr's experiments on as perfect a basis as is possible in the existing state of electrical science.

A. B. BASSET.

Fledborough Hall, Holyport, Berks, November 29.

The Barisál Gun.

I HAVE read with interest Dr. Darwin's communication, in NATURE for October 31, on "The Barisál Guns and Mist Pouffers," and his request that the readers of your journal should give accounts of their own experiences in this matter. I refer him to the *Theosophist* magazine, vol. ix. p. 705, and vol. xi. p. 409, for two articles upon my personal observations at Barisál village itself, in the Gangetic delta. All the various theories until then propounded by men of science to account for the phenomenon in question were severally reviewed and pronounced inadequate. I had intended writing a third and final article, but found it impracticable to throw any further light upon this most interesting problem, and so abstained. Dr. Darwin is quite wrong in supposing that the sound of the "Barisal Gun" is "dull and distant," and that "it does not resemble artillery." However the like sounds may seem to the Ostend lighthouse-keeper, they were so sharp and loud that I thought the "evening gun" was being fired at a cantonment in the village, and asked a friend standing by if that were so. I shall not encroach on your space to go into details, since the back volumes of the *Theosophist* may be consulted at the British Museum, and Dr. Darwin will make such use of them as he sees fit.

H. S. OLCOTT.

Adyar, Madras, November 20.

Remarkable Sounds.

IN connection with Profs. McKenny Hughes and J. P. O'Reilly's letters on the above subject, suggesting the collection of data as to the distance the sound of blasting, &c., has been heard, it may be interesting to state that the blasting operations in the Charnwood Forest quarries (probably Bardon Hill) can be distinctly heard on the higher ground to the south-west of Atherstone, a distance of about eighteen miles. From the intensity of the sound, I have little doubt that under favourable conditions it may be heard very much further.

Geological Survey, Leicester. C. FOX-STRANGWAYS.