

LETTERS TO THE EDITOR.

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Becquerel Rays and Radio-activity.

IN your report of the meeting of the Physical Society of October 31, I find the following sentence given as having been said by me in the course of some remarks on Mr. Ridout's paper on the size of atoms, with the four words which I underline accidentally omitted.

"If the electrons, or atoms of electricity, succeeded in getting out of the atoms of matter, they proceeded with velocities which might exceed the velocity of light, and the body was radio-active."

The omission of those four words made it appear that I had considered the velocity of the escaping electrons to be essentially the velocity of light. In reality, the electrons may escape with velocities possibly less or possibly more than the velocity of light, but certainly not all with one definite velocity.

It is probable that the electrification of air produced by the breaking up of liquids into drops,¹ by a jet of water falling through air,² by water-falls,³ by the bubbling of air through water and other liquids, and by the shaking up of liquids and gases in a bottle,⁴ are all to be explained by the splashing out of electrons in consequence of violent vibrations of molecules of the liquid at surfaces of separation between liquid and gas in rapid relative motion, and at places of disruption between two portions of liquid.

Netherhall, Largs, Ayrshire, November 27.

[The official report of Lord Kelvin's remarks was printed as received.—EDITOR.]

The Conservation of Mass.

WITH reference to the letter from Mr. Sommerville in your present issue, may I state that, in the discussion at the Belfast Meeting of the British Association, I pointed out that the height in the scale pan at which a thing is weighed affects its apparent weight and that the change from this cause is quite within the capacity of the best balances? I also referred to the last report from Sévres by Dr. Guillaume, who made the interesting statement that it would be certainly possible now to observe that one pair of kilogram weights side by side weighed more than they would do when resting one on the other.⁵

These small differences due to distance from the centre of the earth are, however, considerably smaller than the discrepancies obtained by Dr. Landolt, but I mentioned them as representing the kind of unexpected disturbance that might come in without discovery.

KELVIN.

Germis in Space.

I HAVE received the enclosed letter from Mexico with a request to forward it to you; and accordingly I do so, since I suppose it not impossible that the dust of space might contain life germs of some kind. I do not think the suggested bombardment by electric corpuscles sufficient cause, though electric repulsion might sometimes act, and it has been suspected that the earth may have a faint cometary tail; but no such action is needed to account for the existence of cosmic dust of any kind.

Whether the advent of new diseases could be thus accounted for is a possible matter for debate; and incidentally it has struck me to ask whether there can possibly be any physiological discrimination between the, so to speak, windward and leeward sides of the earth on its journey through the ether, giving the morning hours a different "feel" from the afternoon hours. The idea, I admit, is extremely improbable. OLIVER LODGE.

The University, Birmingham, November 19.

¹ Holmgren, *Swedish Academy of Sciences*, 1873.

² Maclean and Goto, *Phil. Mag.*, August, 1890.

³ Lenard, *Ann. der Phys. und Chem.*, 1892.

⁴ Kelvin, Maclean and Galt, *R. S. Proc. and Trans.*, 1895.

⁵ "La Convention du Mètre et le Bureau International des Poids et Mesures," p. 145 (1902).

It is commonly assumed (*cf. e.g.* NATURE of October 16, p. 602) that if life did not originate upon the earth, it must have come upon a meteorite. How it got on the meteorite is not explained.

It occurs to me that there is no reason why small living bodies (*e.g.* spores of bacteria) should not be floating about by themselves in space. We know from recent experiments that the cold of space would not in the least destroy their germinating power, but, on the contrary, would (I presume) preserve them in a dormant state indefinitely.

Now, why should not such bodies gradually settle down upon the earth, without any destructive friction? If this can be, the meteor hypothesis becomes wholly unnecessary. [It is the *same* hypothesis: only the meteors assumed are extra small.—O. L.]

We still have to account for the living bodies in space. Is there any way in which minute particles (as bacterial spores) could leave the earth (or any other planet)? They could be carried far up in atmospheric currents, and my friend Mr. Weinzirl has found bacteria in the mountain air of the arid parts of this country. Is it possible that electric currents (such as produce the aurora) could in some cases carry them far enough to permit them to escape into space? I do not know enough about electricity to judge of this possibility.

THEO. D. A. COCKERELL.

East Las Vegas, New Mexico, U.S.A., November 2.

The Leonid and Bielid Meteor-showers of November, 1902.

IN a letter just now received from Mr. W. H. Milligan, in Belfast, some interesting details are given of observations made in his watch for Leonids at and near the November date of the shower's recently looked for reappearance. As a cloudy state of the sky prevailed generally in England on the nights in question, the result obtained in a prolonged clear view of the sky on at least one of the two most probably predicted mornings of November 15 and 16 for the shower's reappearance, that but one true Leonid, and no sign whatever of any great abundance of the shower, was visible in a watch of 4 hours on the first of those two mornings, possesses considerable interest from the fresh support which it affords to the lately calculated conclusions of very eminent astronomers, that the meteor-stream's celestial route, instead of just crossing the earth's orbit-track, as it did in the shower's three last previous returns and in many bygone centuries, now probably falls, by the effects of planetary perturbations on its course, sufficiently far inside the earth's orbit to no longer give us the magnificent spectacle of a great star-shower.

On the mornings of November 15 and 17, only (on the last of which the sky was overcast in Belfast), could short and tolerably clear views be here obtained of the brightly moonlit sky; and that the shower was indeed feebly active on the former morning was shown by one small true Leonid's appearance at 15h. 52m., of second magnitude, shooting overhead from $134^{\circ} + 47\frac{1}{2}^{\circ}$ to $126\frac{1}{2}^{\circ} + 54^{\circ}$, about $8''$ in $\frac{3}{8}$ ths of a second, as from a radiant point at $151^{\circ} + 21'$, the only meteor seen in a brief half-hour of cloudless sky well watched for the Leonids from 3h. 45m. to 4h. 15m. a.m. On the night of November 16-17, no meteor at all was visible in a full hour's watch in clear sky from 11h. 45m. to 12h. 45m. From Mr. A. King, at Leicester, I have just now heard that he observed one meteor only—a Leonid—in a 25m. watch on the latter night, and that in $1\frac{1}{2}$ hours on the early morning of November 13 (the only other cloudless time at Leicester in that November period), he observed 7 meteors, not one of which was a Leonid.

The watch, this year, for Bielid meteors on November 23-24 was about equally unproductive of both periodical and ordinary meteors; for in a watch of 4 hours' duration, from 7h. to 11h. on the first of those two nights (the next night being cloudy), Mr. Milligan reports from Belfast that no Andromede at all was there observed, and in $2\frac{1}{2}$ hours of clear sky, until midnight, here, only two shooting-stars (both in the first hour, and none in the last $1\frac{1}{2}$ hour of the watch) were seen, neither of which were Andromede or Bielid meteors. In $1\frac{1}{2}$ hour on the second night, until moonrise and cloud and rain interfered at 15h., only one true Bielid meteor and two other shooting-stars were here recorded.

Regarding his long watches at Belfast for the Leonids, in their recent period, Mr. Milligan writes thus:—

"Below I give a record of the watches kept. Although the results are few, yet from the fact of having seen three meteors—