

It is a singular fact that, despite all the improvements of the dioptric system and the vital urgency of the matter, the side and mast lights of vessels still remain to a large extent in so imperfect a condition. In Paris and Birmingham, the only seats of the manufacture of dioptric lights, ship lights with true lenses have long been constructed on the same principles of the sea-lights which have a radius thirteen times as great. The writer has long urged, both publicly and privately, the employment of more powerful lights at sea, and more particularly the equalization of the power of these lights by using electricity in incandescent lamps of unequal intensity, in the colored side lights, so that meeting or passing vessels shall understand the course and character of each other at much greater distances than are now sanctioned by statutory rules. At the International Marine Conference in Washington, in 1889, the subject of ship lights was amply discussed with reference to azimuthal ranges and vertical divergences, and the conclusions formulated are being now internationally adopted. But the question of *greater intensity of beam* and of *equality of beam* does not appear to have been considered in relation to the greatly changed conditions of vessels thronging the high and narrow seas in these days, and to the ever-increasing frequency of accidents by collision at night. I earnestly hope that the authorities of the United States will yet again take the initiative in effecting this final improvement in ship lights.

In closing for the present these few remarks on lighthouses it is impossible not to give expression to feelings of admiration for the liberal and enlightened policy of the United States in maintaining the lighthouses of their immense coast-line free of toll to all the maritime world. America sets a shining example to many an older country in this as in many other ways. May her maritime prosperity abundantly increase!

A JAPANESE SICK WITH SCARLET-FEVER.¹

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I HAVE been introduced to a Japanese gentleman, aged 23, living in Brooklyn, who is undergoing treatment by Dr. Benjamin Ayres for scarlet-fever. As this is the first case of scarlet-fever I have ever seen in a Japanese, I report it to you. To-day is the twenty-eighth day of the disease. There has been no temperature during the last two weeks. Desquamation has been general for three weeks, mostly behind the knees and about the shoulders. He has now scaly desquamation on the palms and soles; noticed first by the patient on the backs of the hands. The throat showed very marked symptoms and is even now very distinctly red and inflamed. Highest temperature $103\frac{1}{2}$; no albumenuria.

I content myself with this short sketch, as, I think, Dr. Ayres will make a more complete report.

I am the more interested in this case, as it is supposed that the Japanese have an immunity from scarlet-fever. I have tried, without success, several times to inoculate a Japanese subject with the disease, in the hope of producing a protective virus. More recently I inoculated two children who had been exposed to the contagion of scarlet-fever with the blood-serum from a blister on the body of a child who, having had scarlet-fever previously, was artificially immune.

These children, whether protected or not, did not take the disease. More recently still, I have inoculated two cases of scarlet-fever with pure blood-serum from a blister on the body of an adult, who was also artificially immune. The inoculations were made in the arms on the third, fourth, and fifth days. In these latter cases there was no effect if diminished desquamation is not to be considered as one. Both cases ran a mild course. It is my opinion, on which, having so little to go upon, I would not insist too strongly, that blood-serum from an artificially immune subject has a virtue, if not curative, at least preventive. Dr. Seward of the Willard Parker Hospital promised me to make a further investigation in the scarlet-fever ward of his hospital.

I have given you these facts to show you what reasons I have to be particularly interested in the case on which I have summarily reported.

¹ Communicated to the Tei-I-Kwai.

ELECTRICAL NOTES.

IF a student of molecular physics had been asked a few months ago for an explanation of the phenomenon seen when an electrical discharge is passed through a Geissler tube, he would not have hesitated in his reply. He would have shown, from the researches of J. J. Thomson and others, that the phenomenon, in the case of the non-striated discharge, is akin to that of electrolysis, that disassociation was a necessary accompaniment; that, in the case of the striated discharge, the electricity was carried partly by convection and partly by electrolysis, that this was shown by the fact that the conduction did not proceed with the velocity of light, that each stria was a place where electrolysis was taking place, and each dark band a place where the electricity was carried by convection, that the reason why the discharge was not produced with mercury vapor is that it cannot be disassociated, and that the reason that it takes place so readily with other gases is that the converse is the case.

But the recent work of Herr Hertz and Dr. Lenard has caused considerable doubt to be thrown on some parts of this theory. Not that the theory as given above may not be true after all, but it must first explain the phenomena discovered by the above-named scientists, and at present this seems difficult.

A short account of them is as follows: If we take a Crookes tube, i.e., a tube in which exhaustion has been carried to such an extent that the discharge is no longer visible, except where it strikes upon the glass, or some other solid or phosphorescent substance, we find that, as the exhaustion progresses, the rays issuing from the cathode, and producing incandescence or phosphorescence, instead of passing directly from the cathode to the anode, tend to move in a straight line, normal to the cathode. This discharge has been supposed, one might almost say proved, by Crookes, in a series of most masterly experiments, to consist of highly charged atoms of gas, repelled with great violence from the cathode. As the exhaustion becomes more and more thorough, fewer and fewer atoms are left in the tube, and consequently the trajectories of the atoms become more and more nearly straight lines, and, if the tube is bent at an angle between the electrodes, the discharge will strike against the glass.

If this is the real nature of the discharge, it would seem on first sight that it should not be able to pass through a metallic substance. Yet it has been discovered by Herr Hertz that this is not the case, that it passes readily through thin metal plates. From these two facts, that the discharge takes place in straight lines, and that it passes through thin metal plates, Dr. Lenard conceived the idea that it should be possible to produce the discharge in a Crookes tube and make it pass out into the air, and the experiment, when tried, proved successful.

The apparatus used was as follows: A Crookes tube, whose two ends we will call A and B, had the cathode electrode sealed in at A. This was of the usual form, and projected some distance into the tube. The anode consisted of a tube of aluminium, only a little smaller than the size of the glass tube containing it, and surrounding the cathode. On the discharge taking place it would, instead of passing directly from the cathode to the anode, as in the case where the gas was not so much rarefied, proceed normally from the cathode and out of the open end of the aluminium tube constituting the anode and strike against the glass at the other end of the Crookes tube. In these experiments, that end was cut off, and a metal plate cemented across the opening. In the middle of this metal plate a small hole, 1.7 millimetres, was drilled, and this was covered by a sheet of aluminium, .0003 millimetres thick. Consequently, when the discharge struck against the aluminium plate, the latter being permeable to it, it passed out into the air. This was shown by a luminous discharge just outside the sheet of aluminium, and by the fact that phosphorescent substances placed there behaved in the same manner as when exposed to the cathode discharge in a Crookes tube. If, in place of air, other gases were made to surround the aluminium plate, very different effects were obtained. If the gas was hydrogen, the discharge, after passing through the aluminium window, was not scattered so much. If carbonic acid gas, the scattering was much greater. Dr. Lenard points out that, as all gases at